FOOD MANUFACTURE

Incorporating Food Industries Weekly

...RD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 DECEMBER 1, 1954

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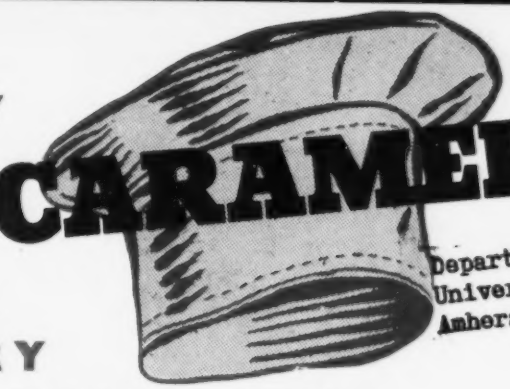


CLARK'S CARAMEL

IN THE BAKERY

The right Caramel, Clark's Bakery Caramel, not only gives colour
but has an improving effect in wheatmeal and malt breads and in rich cakes.

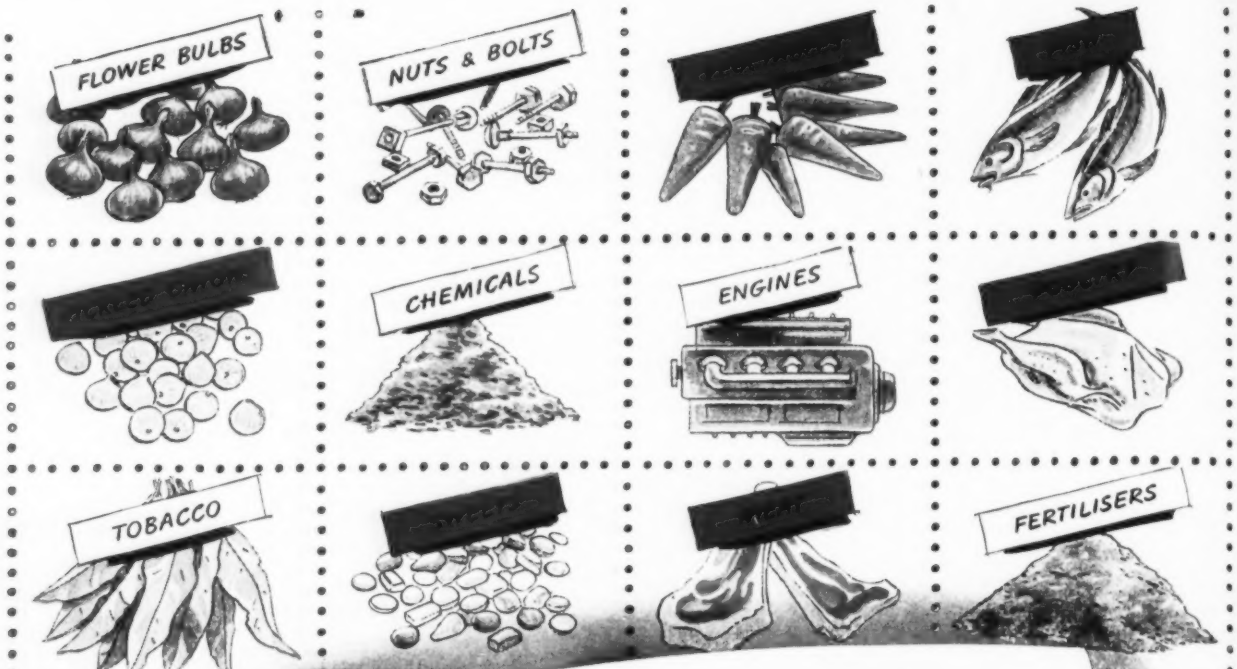
A softer eating crumb is produced, together with a moistness which
improves the keeping qualities. Confectionery Bakers are also using Clark's Mocha D
the "Caramel with a flavour" for buttercreams, cream fillings, fudge icings and fondant.
As well as a pleasing and delicate caramel colour,
it gives a definite coffee-like flavour.

In addition to the normal liquid Caramel as used in the Bakery,
both these grades can be supplied in powder form
for use in wheatmeal flour, cake mixtures
and all types of dry-mixed goods.

G. HAVINDEN LIMITED
71 BAKER STREET, LONDON, W.1. WELBECK 2814

South Africa: G. HAVINDEN (Pty) LTD: P.O. Box 2553, Durban

SOLE WORLD DISTRIBUTORS
OF CLARK'S CARAMEL PRODUCTS



Anywhere anytime

THEY'RE SAFE IN —

'FABLOTHENE'

Regd. Trade Name

THE TRANSPARENT PACKING WITH A LASTING FUTURE

'FABLOTHENE', the new Polythene Layflat tubing, protects and preserves what it shows — simply, attractively, and more efficiently. Inert, stable, tough and flexible, 'FABLOTHENE' keeps in and keeps out moisture, excludes contamination and seals in freshness in Tropic heat or Arctic cold, through corrosive sea air or penetrating dust.

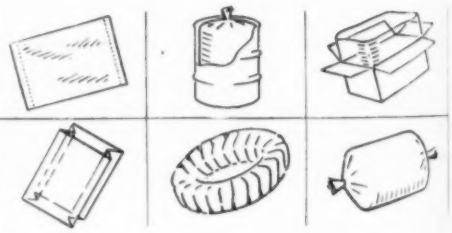
WE ARE EXHIBITING AT THE **Packaging Exhibition**
By Provincial Exhibitions Ltd
18-28 Jan. '55
National & Empire Halls
OLYMPIA
London

STAND № 5 Outer

'FABLOTHENE' is available in tube widths of 2" up to 30" and thicknesses from ·0015" to ·005". As shown here it can be readily sealed into bags or envelopes or made up as drum or case linings.

* *Write for descriptive leaflet and samples.*

Fablothene 'P' is also available—giving you a Polythene film which can be beautifully printed with your sales message and design, in brilliant colours that STAY on, and greatly increase the sales value of your packs.



"Fablothene" layflat Polythene Tube

ANGLO-AMERICAN PLASTICS LIMITED, 1 AVERY ROW, GROSVENOR STREET, LONDON, W.1 · HYDE PARK 9261

"It's all works and no space!"

said the Works Manager

He didn't look good at all. All the marks of a long spell of strain. "For months I've been doing the impossible", he bawled, as we threaded our way through the factory. "And because I did it last time they think I can do it again. Not a square inch of floor space, and now I'm told to find room for a test bench . . ." We stopped him before he exploded. Gently we told him his worries were at an end. We were from Yale. We'd been called in by the management to plan a new scheme for materials handling.

"Materials handling? . . . that's what I told them six months ago! Clear at least three aisles and we could stack to the end bay northlight . . . Well, well.

Here, let me show you the annexe . . ."

He moved like a different man. He had ideas. We had ideas. Together we plotted a scheme that gave him just what he wanted. And, not surprisingly, we pleased the management too — when they saw the turn their costs would take.

IS LACK OF SPACE RESTRICTING YOUR OUTPUT?

Yale's versatile

"WORKSAVER"

is specially suitable for smaller plants

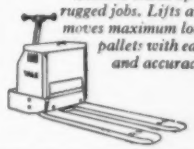
AMONG the wide range of Yale handling equipment the "Worksaver" series of trucks is of special interest to factories where restricted space or low-load floors have previously made mechanical handling impractical. Its small size, light weight and extreme ruggedness give big-truck advantages with small-truck economy and convenience.

It will lift, move and stack raw materials or finished products. It saves time, space and manpower. You can ride it or walk it. And it will start cutting costs from the minute you put it to work.

The "Worksaver" is available in five basic types : pallet, low-lift platform, high-lift platform, fork-lift and tractor.

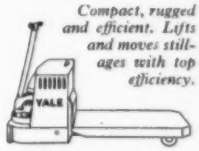
PALLET

Built to stand up to rugged jobs. Lifts and moves maximum load pallets with ease and accuracy.



PLATFORM

Compact, rugged and efficient. Lifts and moves stillages with top efficiency.



TRACTOR

A powerful and manœuvrable tractor unit to pull trailers or trailer trains with up to 700 lbs. drawbar pull.

FORK LIFT *Lifts, moves and stacks over low-load floors : saves time, space and manpower wherever it's put to work.*

YOU GET ALL THESE ADVANTAGES WITH THE "WORKSAVER"

- *Manœuvrable in small spaces and narrow aisles.*
- *Light weight with great strength and power permit heavy duty work on low-load floors.*
- *Dead man control cuts power and applies brakes automatically in emergency.*
- *Simple fingertip controls—unskilled staff can move, lift and stack with speed and safety.*
- *Low initial cost, low running cost, economical maintenance, long life.*

MATERIALS HANDLING EQUIPMENT

MADE IN ENGLAND BY

YALE

REGISTERED TRADE MARK

THE YALE & TOWNE MANUFACTURING COMPANY, MATERIALS HANDLING DIVISION, DEPT. AC.12. WEDNESFIELD, STAFFS. PHONE: WILLENHALL 630

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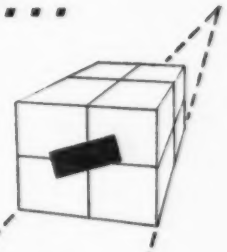

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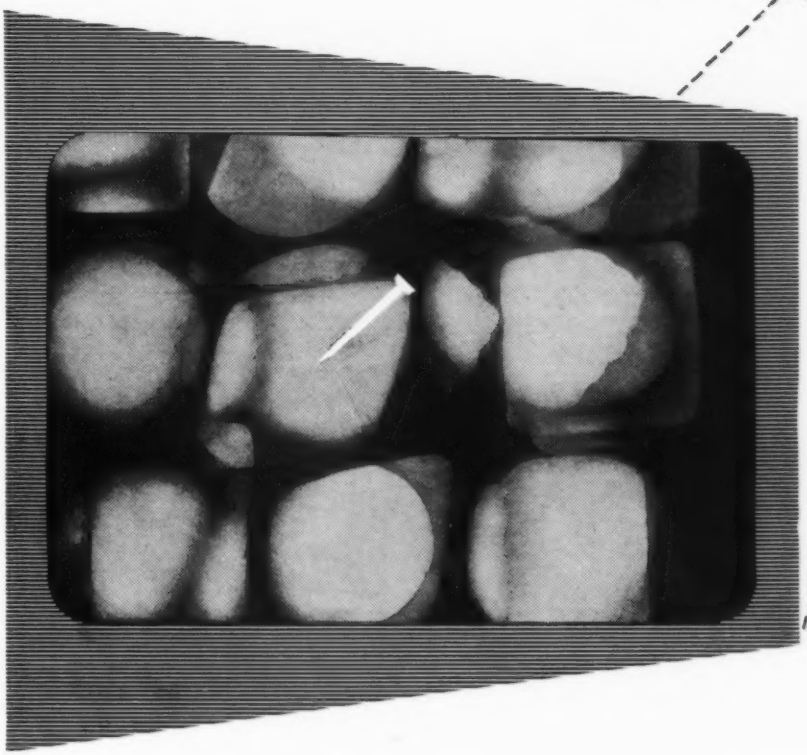

A nail . . . drawing pin . . . stone . . . piece of china . . .
in *your* product can ruin your reputation.
Sooner or later accidents are bound to happen —
even when strictest normal precautions are taken.

Modern production lines should include a Philips "Macro 100" X-ray Unit to detect *visually* that one offending pack that can leave so much trouble in its wake.

Philips "Macro 100" — safe, simple to operate, silent —
is designed especially for this purpose. Let it protect *your* interests.

Better send for full information today !

PHILIPS

PHILIPS ELECTRICAL

LIMITED

X-RAY DIVISION

CENTURY HOUSE · SHAFTESBURY AVENUE · LONDON · W C 2

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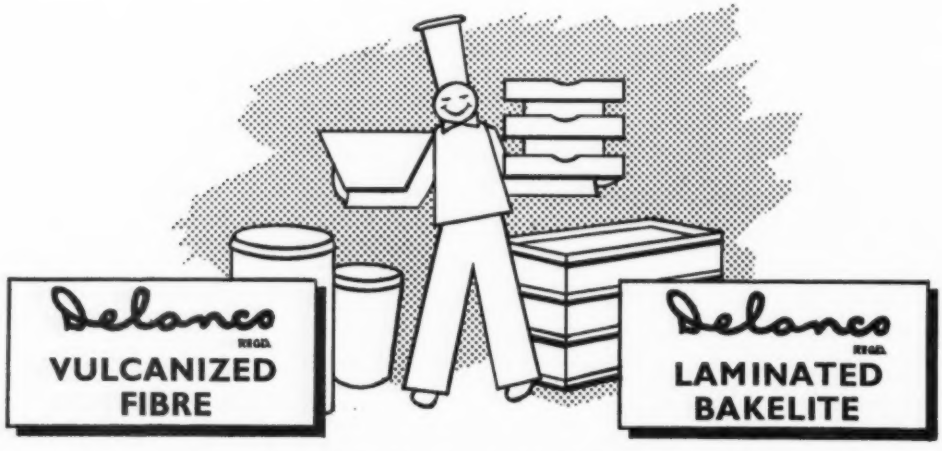


Consult our Designs Department for your particular case or container.

'DELANCO' CONTAINERS for the FOOD INDUSTRY are made from the highest quality raw materials.

We wish all our customers the
★ **COMPLIMENTS OF THE SEASON and EVERY SUCCESS during 1955** ★

ANGLO-AMERICAN VULCANIZED FIBRE CO. LTD.

CAYTON WORKS, BATH STREET, LONDON, E.C.1

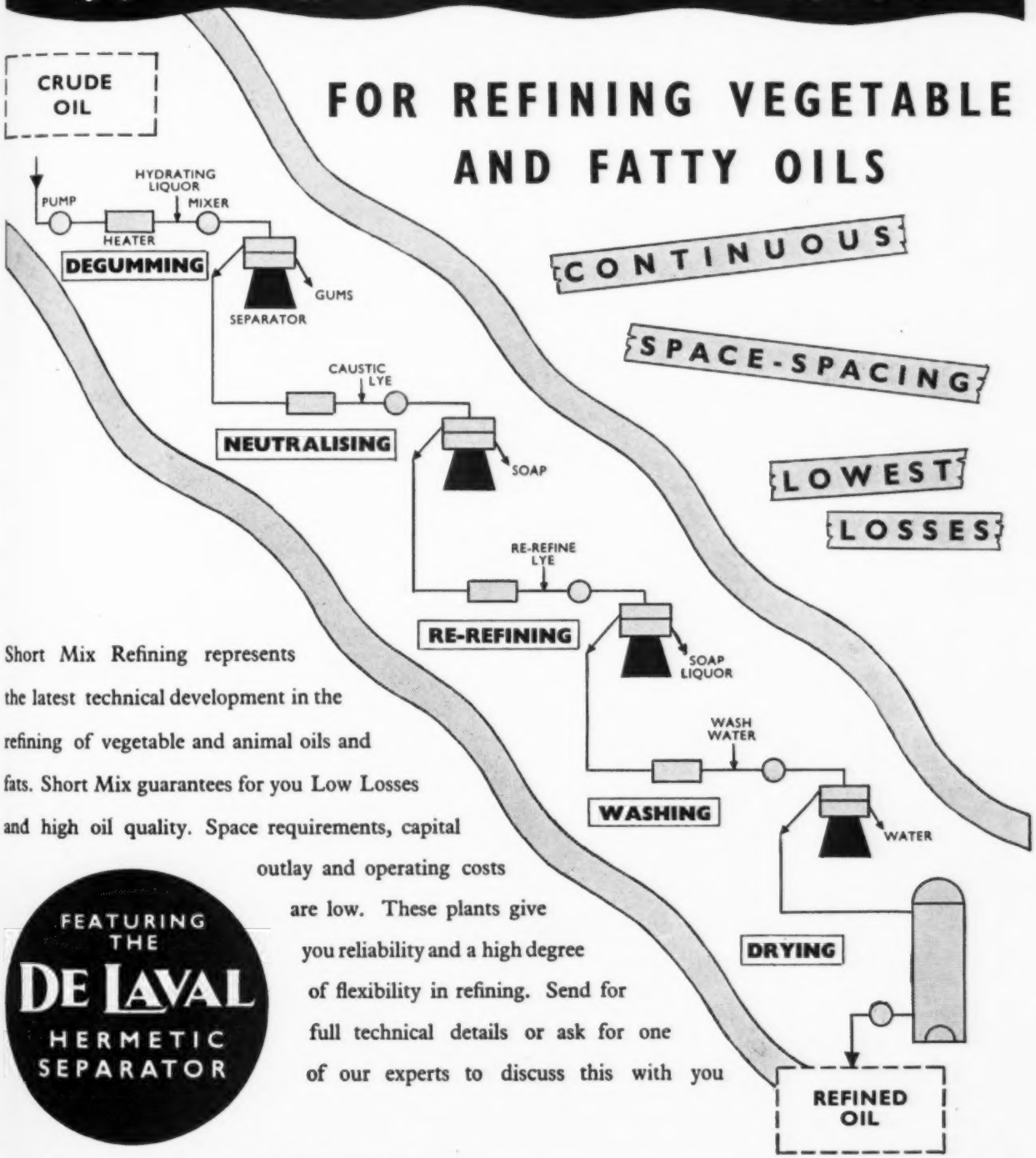
PHONE: CLErkenwell 3271

Fully proved commercially

by 25 plants in 18 countries

THE DE LAVAL SHORT MIX PROCESS

FOR REFINING VEGETABLE AND FATTY OILS



CONTINUOUS

SPACE-SPACING

LOWEST LOSSES

Short Mix Refining represents the latest technical development in the refining of vegetable and animal oils and fats. Short Mix guarantees for you Low Losses and high oil quality. Space requirements, capital outlay and operating costs are low. These plants give you reliability and a high degree of flexibility in refining. Send for full technical details or ask for one of our experts to discuss this with you

FEATURING THE DE LAVAL HERMETIC SEPARATOR

PROCESS ENGINEERING DIVISION

ALFA-LAVAL CO. LTD · GREAT WEST ROAD · BRENTFORD · MIDDLESEX

Smee's D.I. 306

Pattinson's REGISTERED BRAND PRODUCTS

for the
FOOD
Industry

The remarkable covering power of **PATTINSON'S LIGHT MAGNESIUM CARBONATE** *(one gramme having a surface area of 35 square metres)* has resulted in its increasing use in the salt industry, to promote free running by the dual action of separating adjacent salt crystals and by absorbing filamentary water.

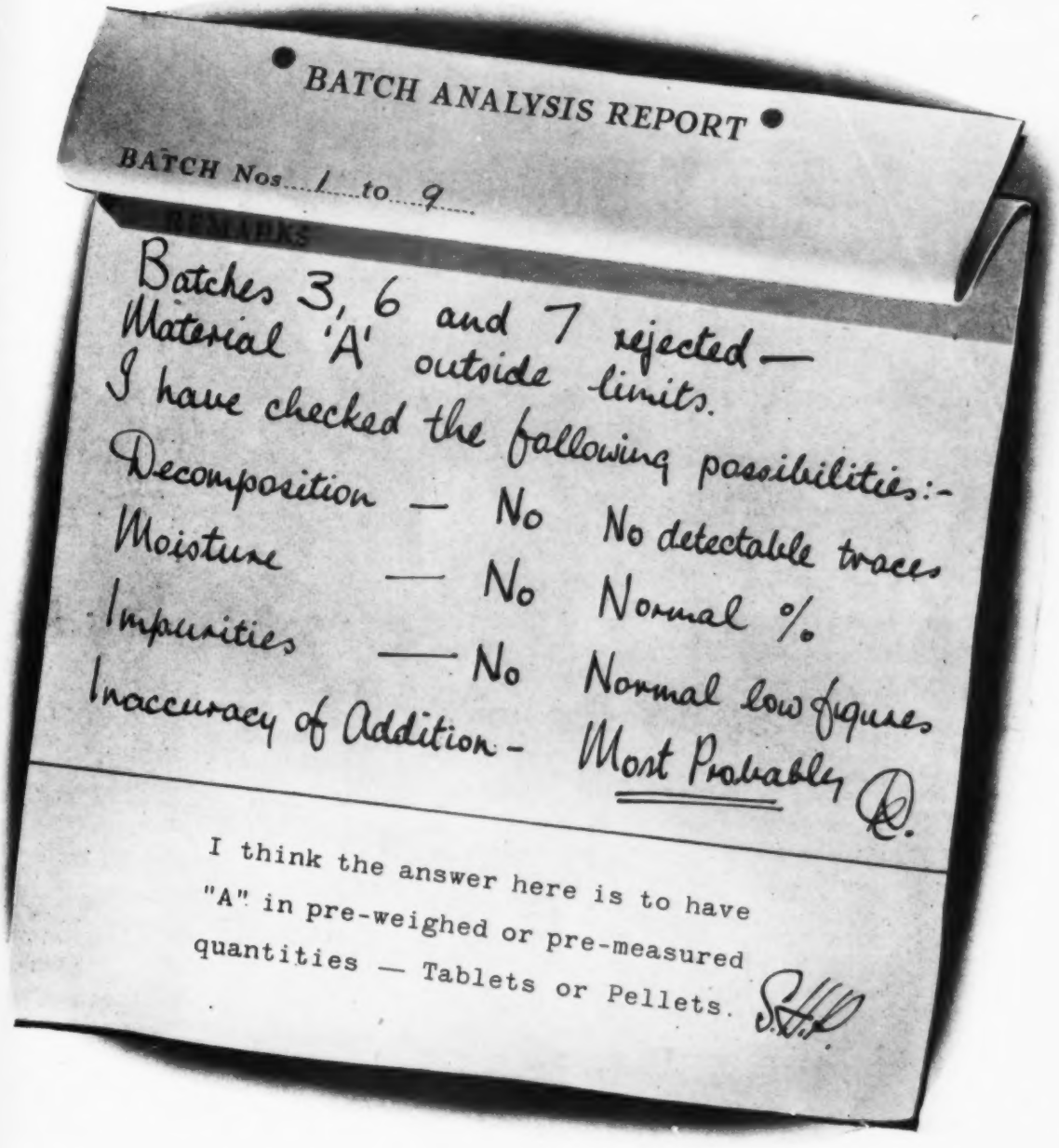
Our Sales Technical Department would be very pleased to advise on the uses of this chemical in any powdered product where free running qualities are desirable.

THE WASHINGTON CHEMICAL CO. LTD.

A member of the TURNER & NEWALL ORGANISATION

WASHINGTON · CO. DURHAM · ENGLAND

DOES THIS START YOU THINKING?


BATCH ANALYSIS REPORT
BATCH Nos 1 to 9
REMARKS
Batches 3, 6 and 7 rejected —
Material 'A' outside limits.
I have checked the following possibilities:-
Decomposition — No No detectable traces
Moisture — No Normal %
Impurities — No Normal low figures
Inaccuracy of Addition - Most Probably
I think the answer here is to have
"A" in pre-weighed or pre-measured
quantities — Tablets or Pellets.

YOU can save waste, save time, increase accuracy and efficiency.

Many powder or granular materials would be
better in tablet or powder form

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Food for thought...

Tubes are the ideal containers for picnic foods — light, compact, hygienic, virtually unbreakable, and their contents fresh to the last squeeze. John Dale Ltd. will be pleased to produce sample tubes suitable to the special needs of *your* food products.

Collapsible metal tubes for foods

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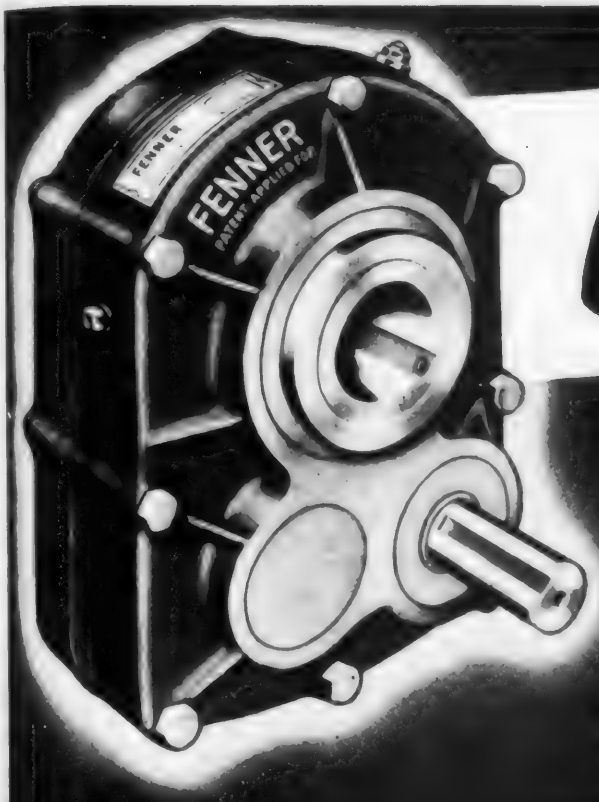

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TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

SAVES TIME AND MONEY

Designed to mount directly on to the driven shaft of the machine. A Torque-Arm anchors the Reducer and NO BASEPLATE, FLEXIBLE COUPLINGS OR MOTOR SLIDE RAILS ARE REQUIRED. Lining up of the conventional reducer is eliminated. Just slip the unit over the shaft, key it in position, anchor, and it is ready to run. Available in 4 sizes up to 12 H.P. from STOCK, at Fenner Branches and Distributors.

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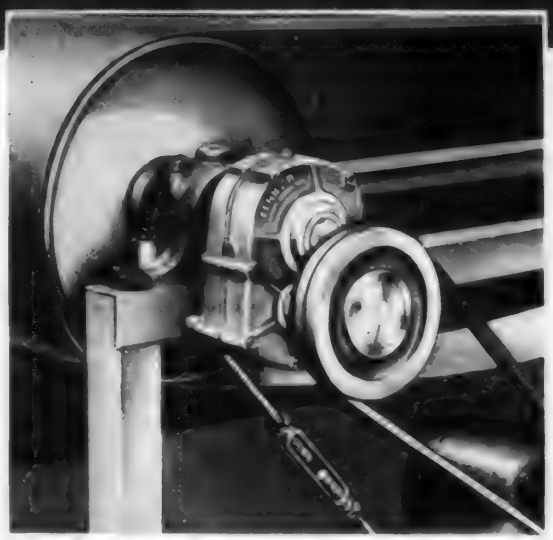

Write for illustrated Catalogues giving all the facts.

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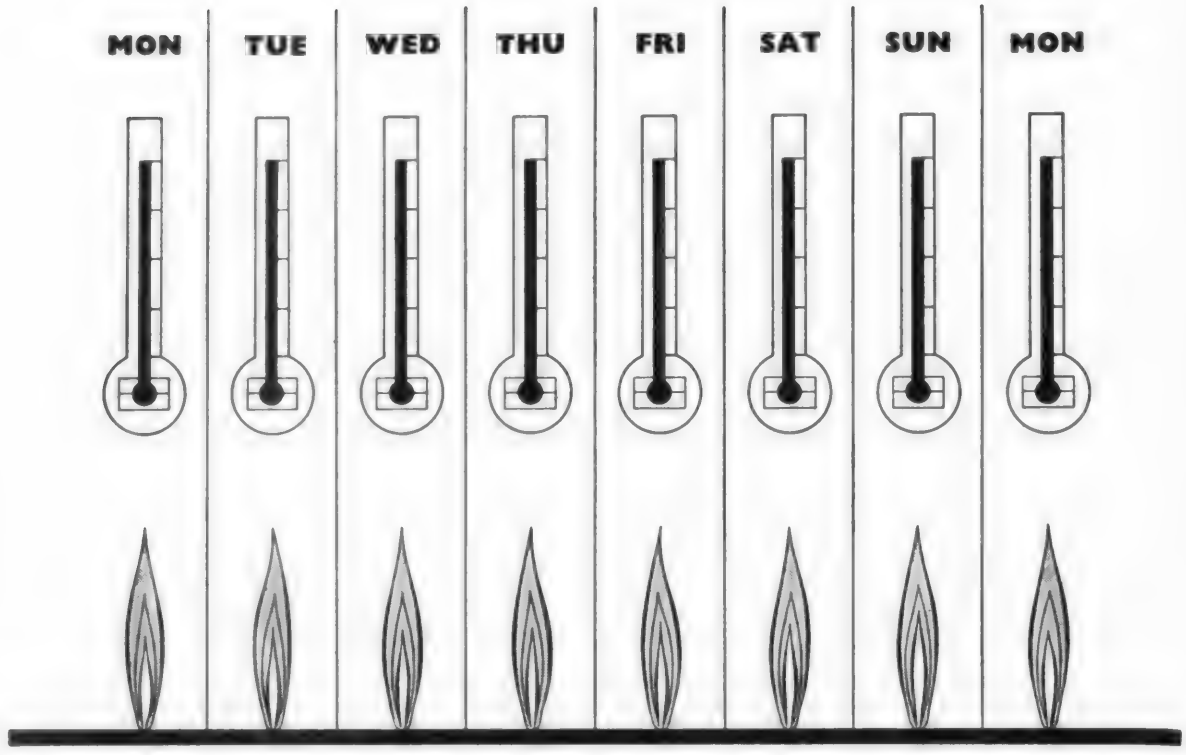

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Manufactured in mild steel, stainless steel or mild steel with integrally clad material of stainless steel or monel.

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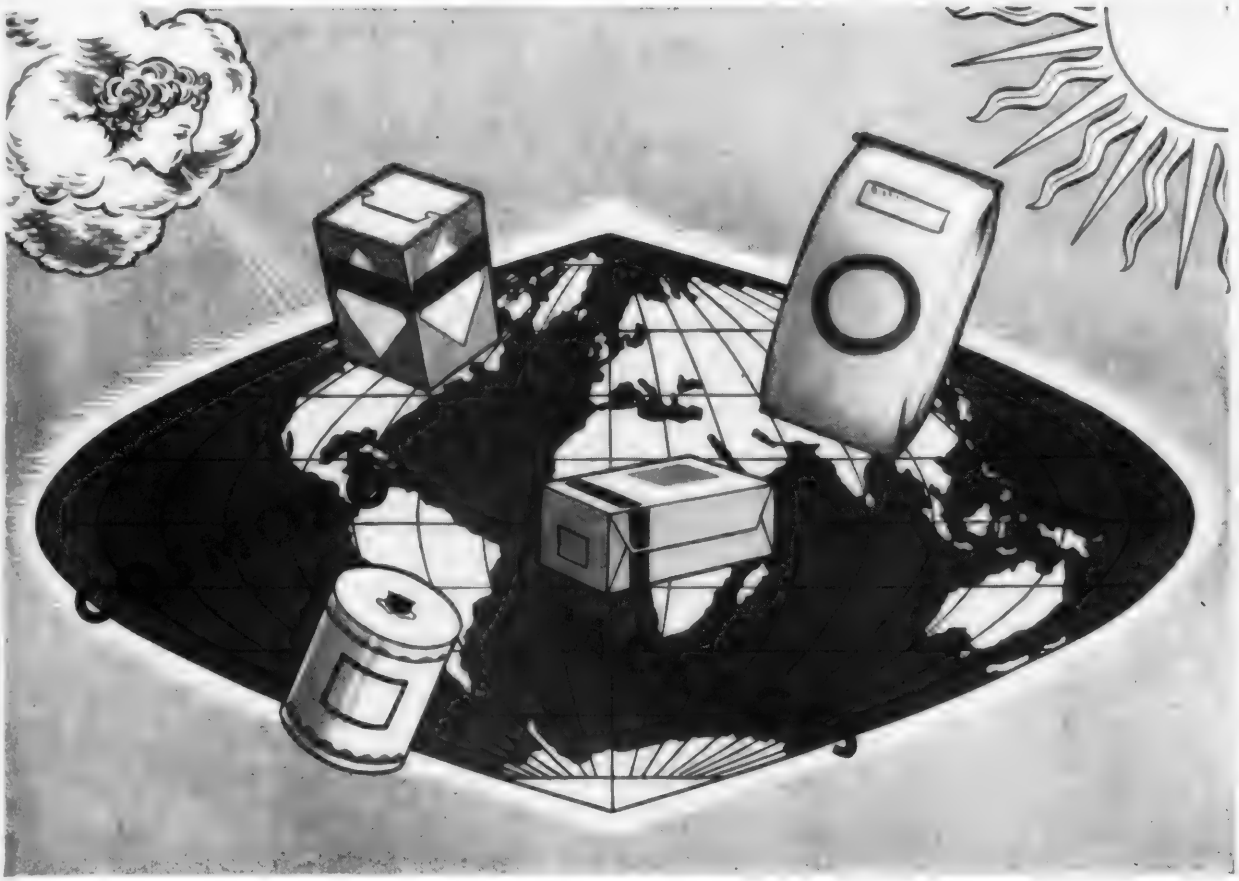

travel safely on the trade routes of the world

TELCON

One of the most revolutionary advances in protective packaging today is *TELCOTHENE — the thermoplastic pioneered by the Telcon organisation. Applied as a continuous coating to paper and board, it gives to these materials a new and tougher resistance to the varying climatic changes encountered in transit. It makes all kinds of goods better and more dependable travellers, ensuring their perfect condition on arrival. TELCOTHENE is hygienic, moisture-proof, non-toxic, heat-sealable, and will not support mould growth in tropical climates. Now being produced in the largest plant in the country, TELCOTHENE coated paper is attracting the interest of those who engage in the manufacture, packaging and distribution of foods.

**Telcothene—Polythene processed by Telcon to provide specific characteristics.*

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Coated Paper and Board

Product of the Plastics Division of

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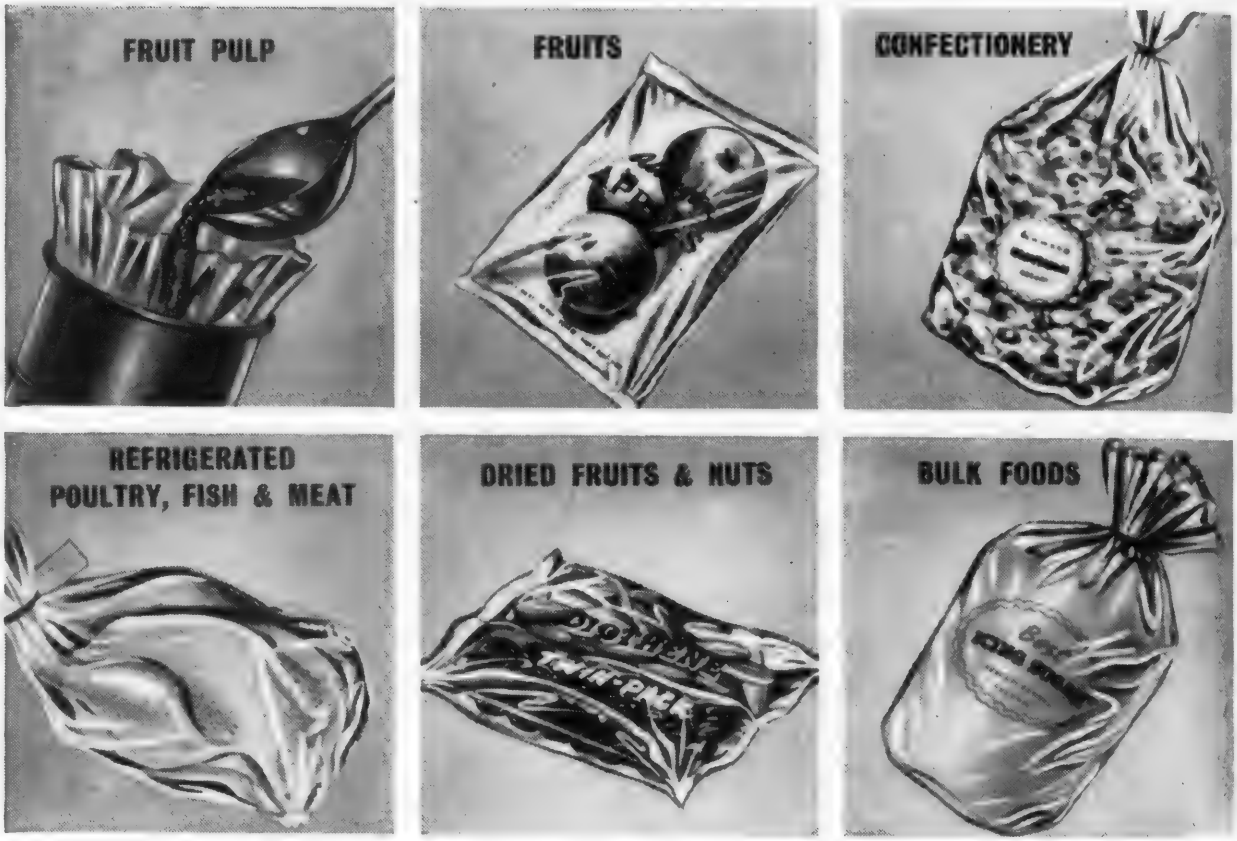
Could Diothene be used
(Polythene)
for your product?



TRANSPARENT . . . for eye and appetite appeal . . .
TOUGH for protection . . . completely HYGIENIC

Diothene is a new, transparent flexible film with outstanding qualities for the packaging of food either in bulk or in packs for the counter. It is tough—does not easily tear or puncture; it is transparent—shows the contents attractively; it is sterile—has no odour, is non-toxic and cannot taint the contents. Diothene is moisture-proof, liquid and sift proof, can be sealed easily and is unaffected in deep-freeze storage. Diothene can be supplied in quite small bags suitable for counter sales or in heavy gauge bags suitable for large quantities.

Flexible Packaging Ltd at their factory at Portsmouth, manufacture the Diothene film, make up bags to exact specifications in any quantities and print in multi-colour—all under one roof.

This service assures prompt deliveries and competitive prices. And because Flexible Packaging Ltd are now a subsidiary of The Metal Box Company, users of Diothene can take advantage of Metal Box design and research facilities—the most extensive in the country covering packaging requirements.

MB DIOTHENE (POLYTHENE)

DIOTHENE WILL KEEP IT CLEAN

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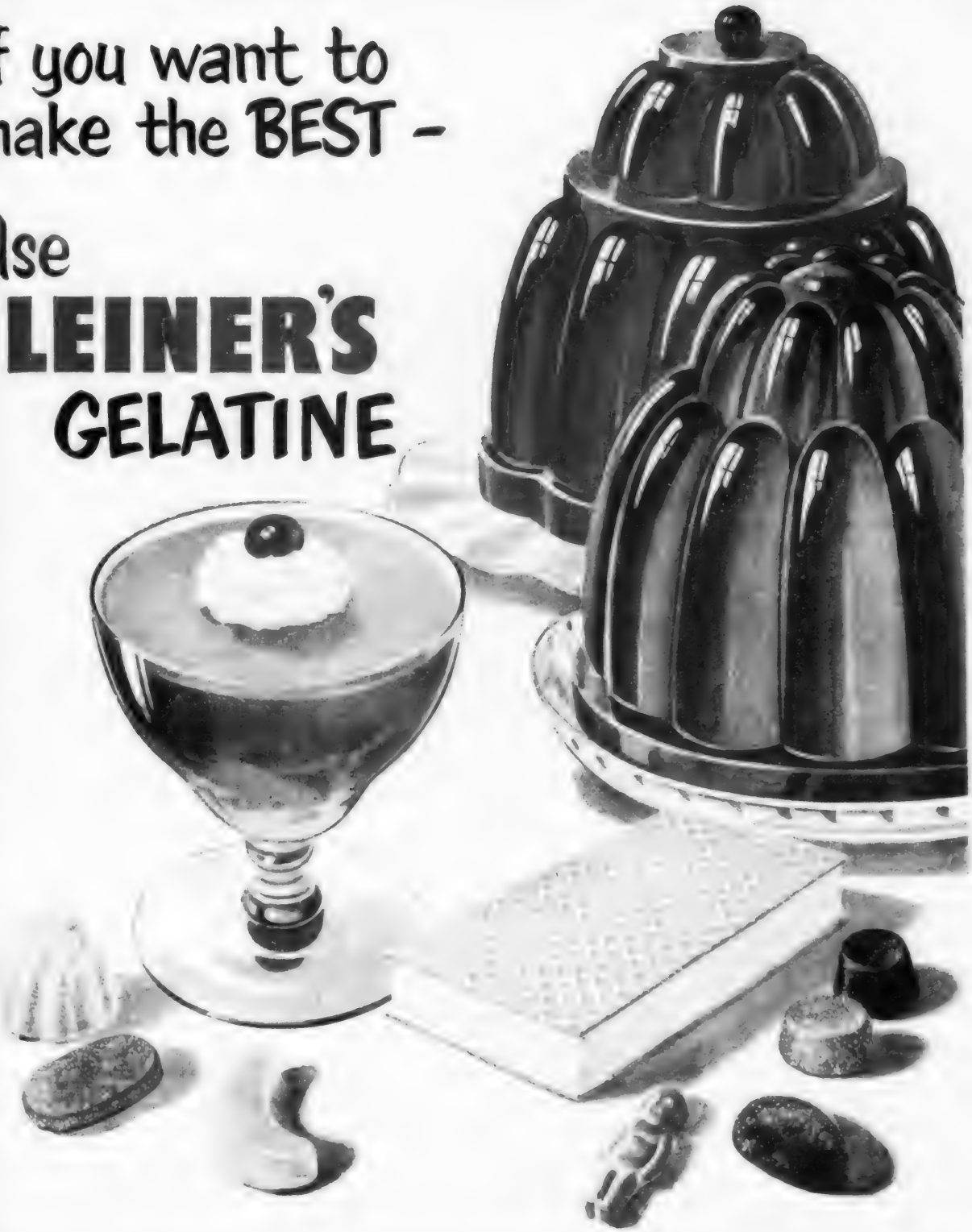

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The entry of British Cellophane Limited into the field of transparent packaging marked an era of development which has since brought immeasurable benefits to manufacturers of a wide variety of products in Britain and the world over.

The tremendous success of "Cellophane" with its superlative transparency as a sales medium, rapidly made its use universal, the trade mark a household word and British Cellophane Limited the leading manufacturers of cellulose film in the U.K., in Europe and the Commonwealth.

The widespread usage of "Cellophane" has given British Cellophane Limited a fund of experience in flexible packaging second to none—a fund which through the medium of the Company's highly qualified scientists and technicians is constantly being applied to the successful solution of the packaging problems of British Industry.

Since the war the Company's experience, skills and resources have been applied to the production of other packaging films—all of the same high standard of quality as the world-famous "Cellophane"—and associate companies have been formed all over the world. This rapid and assured expansion goes on, with increasing benefits to all manufacturers who wish to develop their own potential through better transparent packaging.

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Sales Offices: 12/13, CONDUIT STREET, LONDON, W.1.
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"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

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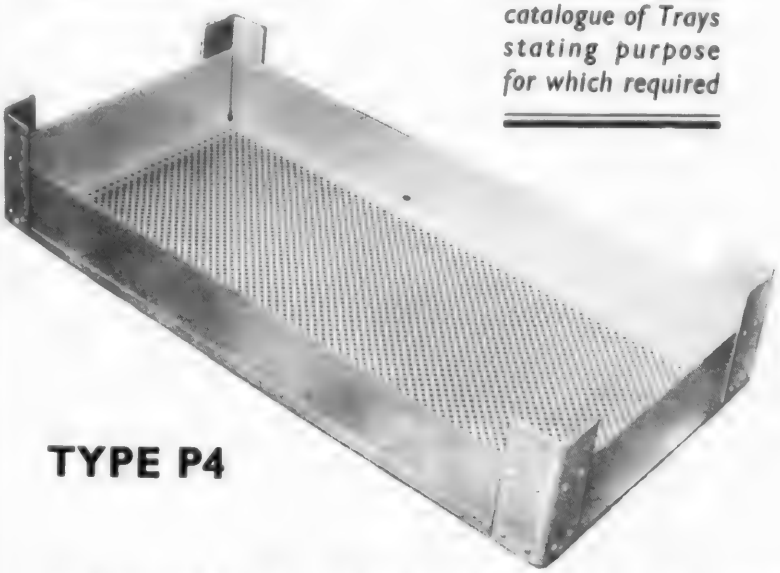
Phœnix Trays have been supplied to answer many specific requirements in the food and confectionery industries. In every instance their supreme fitness for the job has been proven in lighter work, easier cleaning, rigid Interstacking and sturdy service.

ALUMINIUM PRESSED TRAYS

These trays have the great strength of high quality aluminium, plus the light weight that goes with it. Used widely for Biscuit and Cake processing, they have many other applications in manufacture when made to the dimensions required, with special features incorporated to customers wishes. They can be made to interstack or not, and are the economical answer in hygiene, long service and easy cleaning.

TYPE Pr 1

Send for illustrated catalogue of Trays stating purpose for which required



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Precision manufactured in highest grade aluminium with perforated base integral with sides and ends. Reinforced corner angles are designed for accurate interstacking, leaving lifting space between stacked trays for easy handling. Used for many purposes where cooling and hygiene are of paramount importance, e.g., Restaurant crockery trays; Processing with sugar confectionery; Nut sorting and a wide variety of other uses.

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in all shapes and sizes

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Metal Box

'know-how'

does count!

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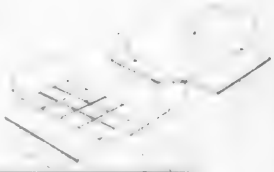

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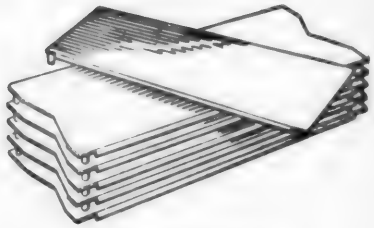

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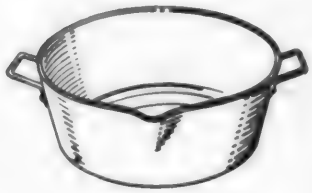

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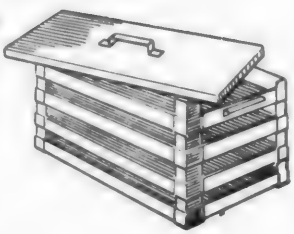
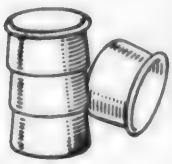
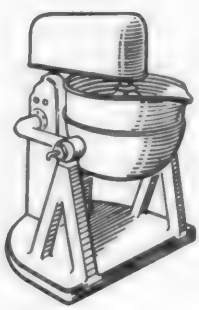
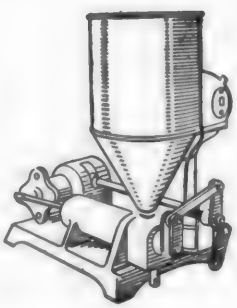
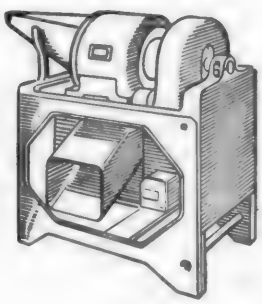




goes a long way . . .







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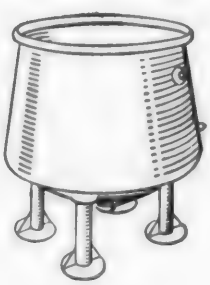

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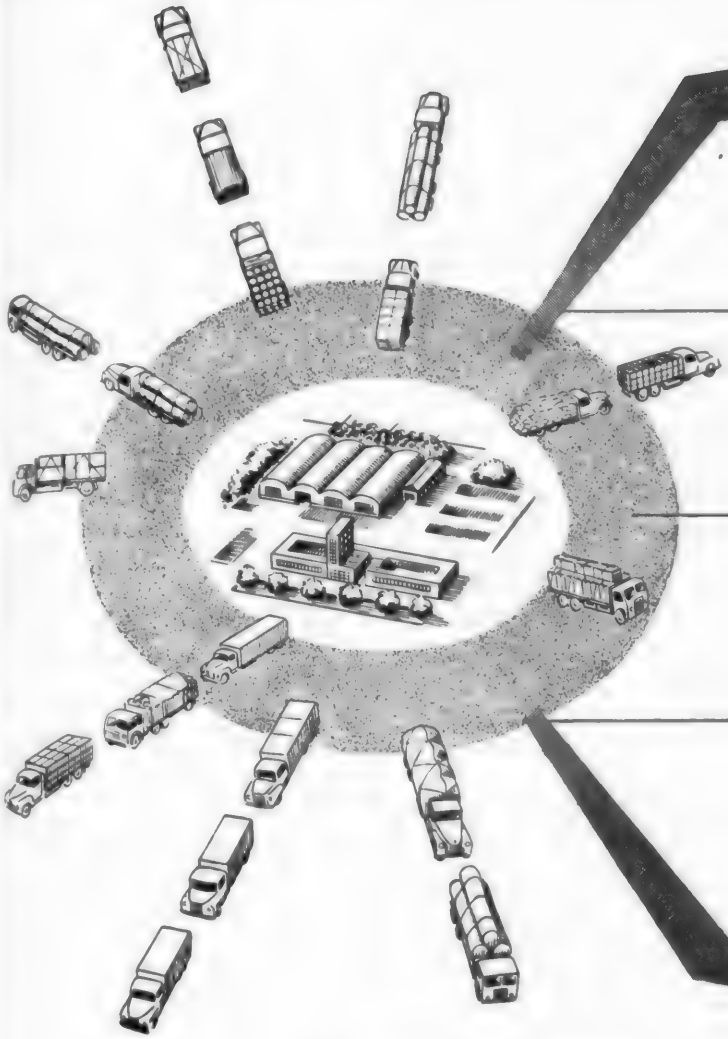

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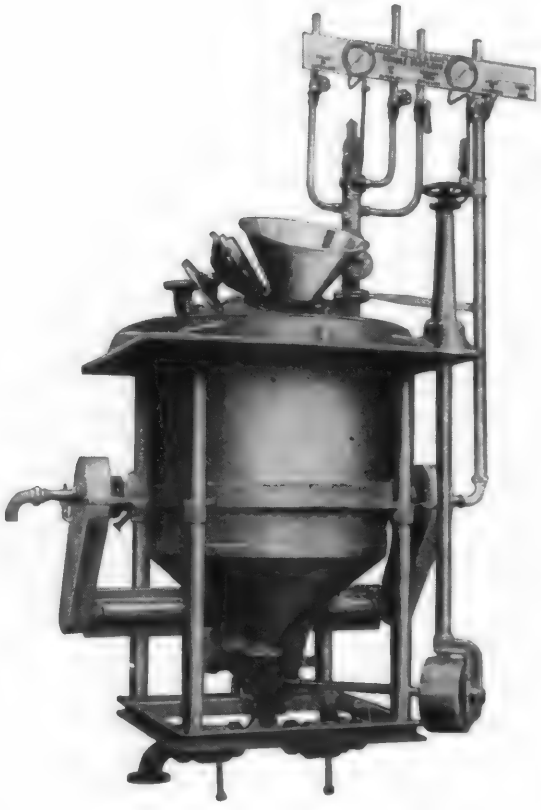

FOR PROCESSING FRUIT PULPS, JAMS, JELLIES, JUICES WITH STEAM AND COMPRESSED AIR OR STEAM AND VACUUM ARRANGEMENTS

Patent No. 684357, other patents pending

No steam jacket is employed, there is no local overheating or skin burning of the product, no pitting or erosion.
NO METALLIC CONTENT IN THE FINISHED PRODUCT

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The rotating movement of the Calandria continually cleans the heating elements

The ratio of the rotating heating surface to volume is 50 per cent greater than that of a steam jacketed Autoclave resulting in greatly increased production

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POLYTHENE PLUS EXCELLENCE IN PRINTING

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They have now produced B.C.L. "K" POLYTHENE—a polyethylene film KEYED to accept printing inks readily and hold them permanently.

Thus, to the well-tried protective qualities of their polythene film which makes it so dependable and versatile a packaging medium, B.C.L. now add an advantage which will increase enormously its commercial possibilities.

The special process is not a coating which comes off with normal handling and use but an integral treatment of the film which leaves its purity and non-toxic properties untouched.

PATENTS HAVE BEEN APPLIED FOR

B·C·L KEYED POLYTHENE

1. Provides a receptive surface for clear, bright and durable printing.
2. Laminates more readily . . . is more suitable for pressure sensitive tapes.
3. Retains all the **toughness, moistureproofness, purity, resistance to chemical action** and **great flexibility** inherent in polythene film.
4. Is available in the usual gauges from 150 to 500, both in layflat tube and roll form.

AT NO EXTRA COST!

B.C.L. polythene film which gives packaging perfection for a diversity of goods from frozen foods to machine parts and can now be successfully printed, may be the answer to your packaging problems. The scientific and technical services of British Cellophane Limited which made this great general advance possible are as readily at your disposal for your own particular needs.

Send today for samples and full details of the new . . .

B·C·L

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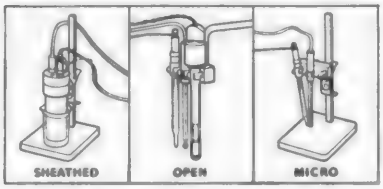
PYE pH METER
AND MILLIVOLTMETER
DIRECT READING — MAINS OPERATED



Electrode Kit to make up all the assemblies illustrated and all necessary accessories are supplied complete with the instrument.

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". . . we write to inform you that our recommendations for the purchase of a number of these equipments for use in our Routine Laboratories have been accepted. You can expect, therefore, within the next week or so to receive orders from a number of our factories. . . . We feel you would like to hear from us this tangible proof of how satisfactory we found your instruments."

Signed: Director of Research.

May we send you details of this and other instruments in our comprehensive pH range ?

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WG.59

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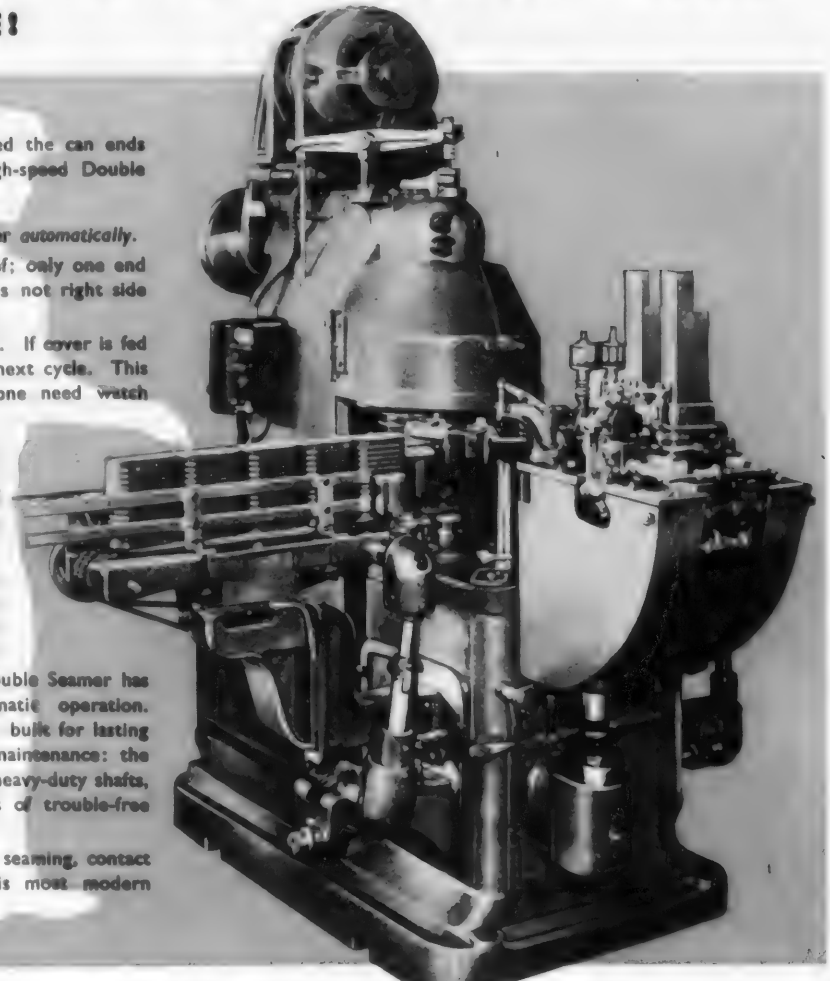
BLISS HIGH-SPEED DOUBLE SEAMER WILL PRODUCE 80 to 120 SQUARE OR IRREGULAR-SHAPED CANS PER MINUTE!



- All the attendant has to do is feed the can ends into the magazine. The Bliss High-speed Double Seamer does the rest—
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  - End feed is positively foolproof; only one end can be fed at a time; if end is not right side up, it is rejected *automatically*.
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  - The Seamer uses ends with *straight* flanges, eliminating the need for use, unless preferred, of more costly ends with started or curled flanges.
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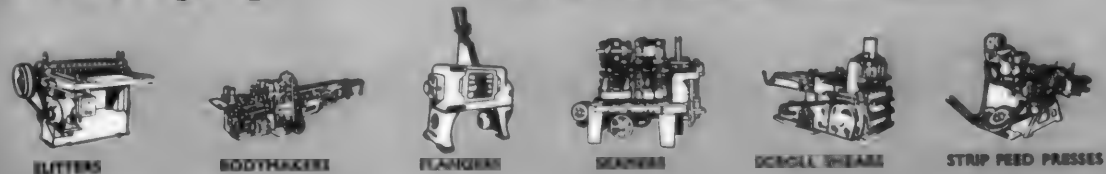

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"INSULIGHT" Hollow Glass Blocks transmit light to the dark heart of a building or a room, diffusing it over wide areas, in places where ordinary glazing would be undesirable. They cut the racket of the factory, the roar of traffic to a subdued murmur. In places where hygiene is essential, their smooth hard surface is easily cleaned. They hold warmth in and cold out. They keep private places private. In fact, "INSULIGHT" Hollow Glass Blocks do the work of walls—but walls of light.

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HG 17

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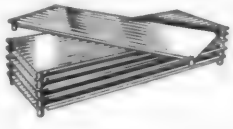
'WARWICK Tubs are strong light and hygienic'



20 Gallon Tubs

Having a capacity of 5,500 cubic inches. Are suitable for holding at least 1 cwt. of Foodstuffs — widely used in the Butchery, Fishing, Canning and similar industries.

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Food manufacture and fresh, hygienic conditions are all too often uneasy partners. But keeping everything spotlessly clean is one of those daily problems now made incomparably easier by the use of TEEPOL. Preparation tables, kitchens, equipment, the building itself—washrooms, toilets, rest rooms, canteens—all can be kept at the highest level of hygiene by cleaning with TEEPOL. This wonderful Shell detergent cleans all washable surfaces more thoroughly, at greater speed and at noticeably lower cost.

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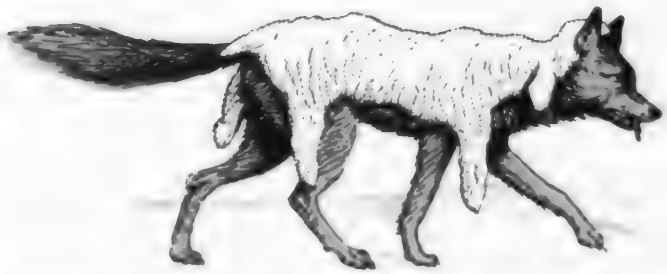


but not here

This Semtex installation in the Liverpool premises of Threlfall's Brewery Company Ltd. was carried out in corrosion resistant paviors bedded and jointed in Semtex Latex Cement

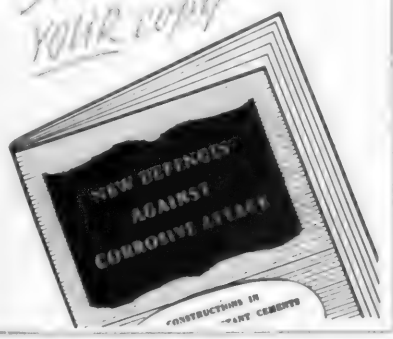
It loiters in food factories where organic acids, alkaline action, heat, steam and other conditions encourage corrosion. Yes—*corrosion is it's name.* In many factories, structures of floors which *looked safe* have eventually revealed this masked enemy. In others it finds no entry. Why? Because all surfaces exposed to risk have been treated in accordance with the Semtex technique; selection of the right anti-corrosion cement for the job.

Semtex has available a whole range of such compounds, membranes, linings, bedding and jointing materials, protective paints and so on. As corrosive-resistant as the dependable bricks and tiles they are intended to bond, they are used by the Semtex organisation in the execution of corrosion-resistant structural schemes all over the country.

This company welcomes enquiries from those who would like to know more about its specialist service or about the anti-corrosion products which are available to firms who employ their own maintenance units.

Comprising 28 pages of useful data and copiously illustrated with photographs of Semtex corrosion-resistant installations, this booklet describes the full range of Semtex cement compounds in detail and gives the factors governing the choice of an appropriate cement. A complimentary copy will be sent you on request.

Send for YOUR copy



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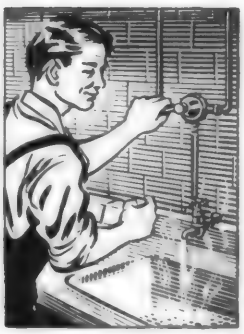
with automatic temperature control



Hot water, plenty of hot water from tepid to very hot, instantly, cheaply—that's what you want and that's what you get with a Leonard Thermostatic Steam Water Heater. Hot water is made only when it is wanted and where it is wanted. There are no heat losses through storage or radiation. No expensive piping or equipment required. The Leonard Thermostatic Steam Water Heater is easily and quickly installed—no upsets, no delays. It is widely used in Laundries, Tanneries, Textile Mills, Breweries, Dairies, and other Food Industries, Tinplate Works, etc.

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The standard Apple Pectin. Completely starch-free, its high quality, clarity, and jel-making properties never vary.

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A pectin of standard "Elpex" setting strength but specially prepared for the darker jams where maximum clarity is not essential.

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E.D.A. are publishing a series of books on " Electricity and Productivity ". Four titles are available at the moment; they deal with Higher Production, Lighting, Materials Handling, and Resistance Heating. The books are 8/6 each (9/- post free) and the Electricity Boards (or E.D.A. themselves) can supply you.

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Automatic AIR VENTING of process steam plant for increased output

AIR in the steam spaces of process heating units prevents the plant from giving its best output. Why is that? Is it a general condition? Is it serious? What can be done about it?

A few questions and answers:

Q: *Where does the air come from?*
A: When steam is off, air enters through valves, traps, joints, and fills the pipes and the steam spaces of the plant.

Q: *What harm can the air do?*
A: It does a surprising amount of harm. When steam enters the units it condenses, but the air cannot condense. And if it cannot get out, the air does two things; it hangs about as a stagnant film on the inside surfaces, and it mixes with the steam.

Q: *What then?*
A: The film of air puts up a tremendous resistance to the flow of heat from the steam to the process. That reduced heat transfer slows down the job, often seriously. The air that mixes with the steam reduces the effective temperature of the steam.

Q: *Can't the air get out through the steam traps?*
A: Sometimes yes, sometimes no. Some steam traps can cope with air, some cannot. But even using traps that can release air, on many jobs a lot of the air cannot get to the traps anyway. Something else has to be done.

Q: *What else?*
A: You can use hand cocks, but they are hardly ever satisfactory: either a lot of steam is blown to waste or a lot of the air never gets out. The only satisfactory way is to use automatic air vents.

> "Of all the problems that confront the steam user, the removal of air from inside heating surfaces is the most neglected, yet it is one of the most important. . . . Air is the arch enemy in steam and must be removed as rapidly and completely as possible."
>
> — *Oliver Lyle in "The Efficient Use of Steam."*

Q: *What are the advantages of automatic air venting?*
A: The vents automatically open to air but close to steam. On starting up the job, air is released full bore through the vents, giving quicker starting (warming-up times have been halved); the vents open to discharge any air that collects during running. They accelerate heat transfer and improve processing temperatures. They make possible a much better output performance (10 per cent., 15 per cent., even more, according to the particular condition).

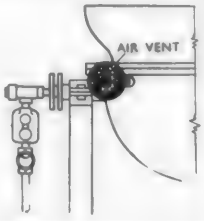
Q: *Where can I find out more about automatic air venting?*
A: Send the request slip for the Information Sheet "Air in Steam Spaces" and the Pamphlet describing Spirax Automatic Air Vents.

Spirax-Sarco Ltd CHELTENHAM *Phone: Cheltenham 5175-6 Grams: Spirax, Cheltenham*

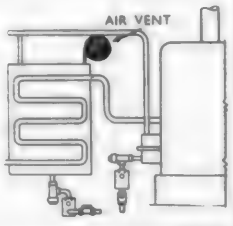
LONDON OFFICE: *28 Victoria Street, S.W.1. Abbey 6101-3832*

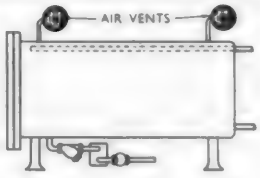
One of the series of Spirax Thermostatic (Automatic) Air Vents.

Spirax Automatic Air Vents for steam-jacketed boiling pans.



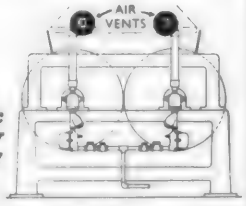
Spirax Automatic Air Vents for stills of various types.



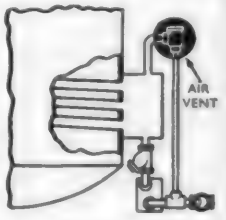


Spirax Automatic Air Vents for retorts and digesters.

Spirax Automatic Air Vents for cylinder drying machines.



Spirax Automatic Air Vents for evaporators of various types.



FOR INFORMATION PLEASE USE THIS REQUEST SLIP

Please send Information Sheet "Air in Steam Spaces" and Pamphlet No. 108 on Spirax Automatic Air Vents.

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It can be stated that 90% of bearing failures are due to the ingress of foreign matter, and by reason of the great strides which have been made in the manufacture of special lubricants, it has been possible to provide a bearing mounting requiring no servicing whatsoever.

The one piece housing and solid sleeve, enables the bearing to be fitted as a complete unit, thereby eliminating the hazards of an exposed bearing. Further, the improved sealing devices are of the flexible type bonded to a metal insert, ensuring long trouble free service and are not called upon to align themselves to the malalignment of the bearing housing.

This bearing unit gives a life equal to, or greater, than the standard open type bearing of similar size, periodically lubricated, and is available from ½" to 4" shaft diameter.

Flange units incorporating the same advantages as outlined above are also available. The drawing on left, illustrates the flange unit design.

Catalogue SL/2/54 giving further details is available on application to Room G2, Technical Sales Department.

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With Crompton Parkinson you still have certain differences of a welcome nature—the differences that arise from an organisation that insists upon materials, brains and workmanship of the highest degree obtainable. Users of "KLOSD" motors will find these qualities exemplified in continuous and long-lived efficiency.

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First comes technical advice on the customer's problem (full information about B.S.I. specifications on collapsible tubes always available), then a designing service, finished drawings and high quality printing. When delivery is due, BETTS can offer storage facilities of the finished product allowing part delivery of bulk orders over any period.

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APV is now making the Manton-Gaulin homogeniser, the machine which leads the World in homogenising efficiency, engineering design and hygienic construction. By agreement with the Manton-Gaulin Manufacturing Company of Massachusetts, U.S.A., APV is now manufacturing at Crawley and selling in all countries in Europe and the Commonwealth this famous homogeniser whose exclusive features have made it America's largest selling machine.

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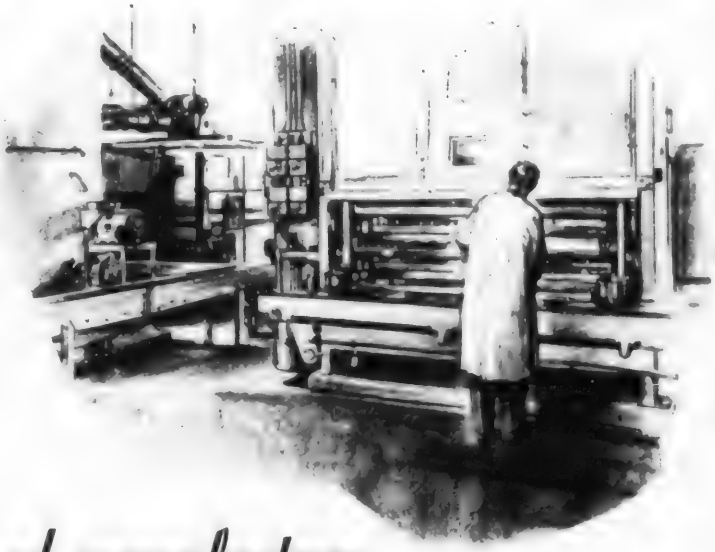

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Whenever a power drive is needed, there is a BTH motor that will do the job efficiently and economically. In industries all over the world, BTH motors are helping to increase production. Over half-a-century's experience of this branch of electrical engineering enables BTH to offer the motor with the mounting, enclosure, rating and performance best suited to the application.

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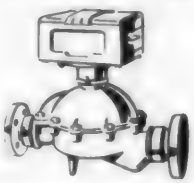
1½" S 7. stainless steel meter with screw on flanges and 12" vertical index.

When you require to measure bulk or batch quantities of edible liquids, oils, spirits and solvents, hot or cold water, we can supply meters with summating, resettable, electrical presettable, direct reading or pointer type index attachments (as illustrated) and control equipment.

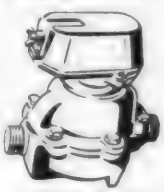


BOX TYPE COUNTER

Re-settable batch-dispensing counter with 7-digit cumulative total register.

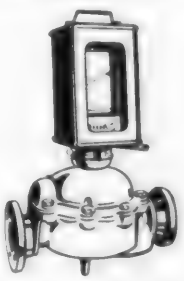
VERTICAL RE-SETTING INDEX

Can also be used to pre-set a determined quantity, with electric trip to operate solenoids, pumps, warnings, etc.



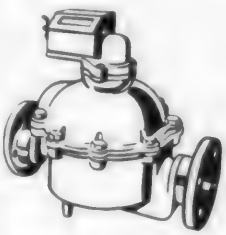
ZEROSET INDEX

Simple turning motion re-sets indicator to zero.



MECHANICAL RECORDER

Gives a graphic record on 5" x 12" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods



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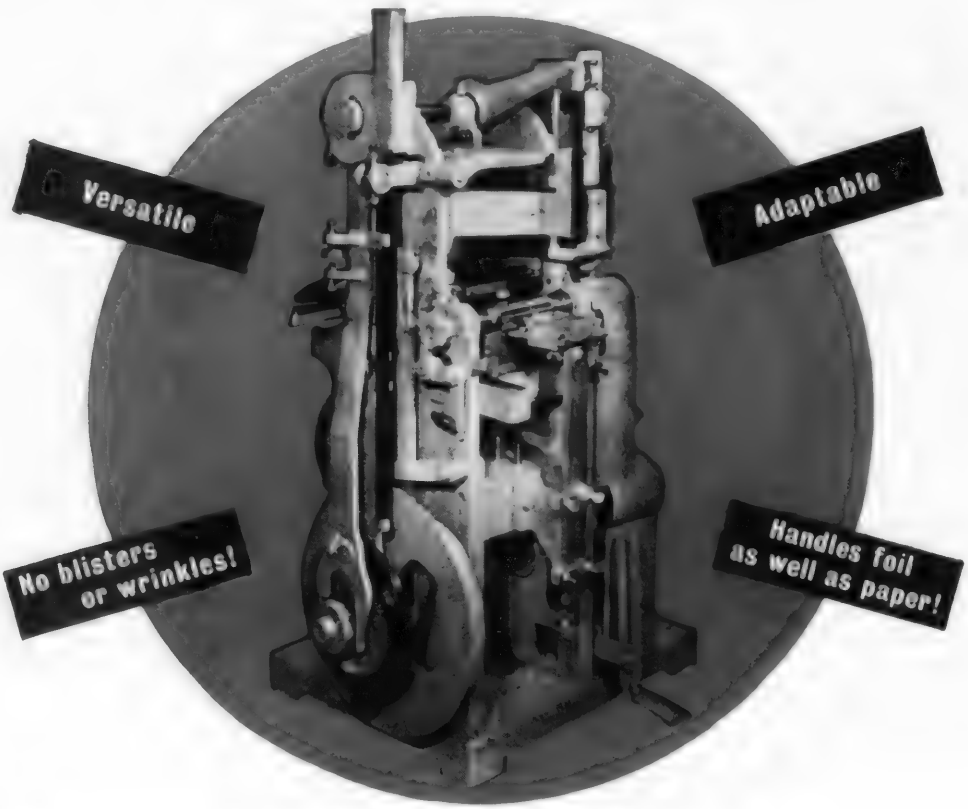

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G. D. PETERS have much pleasure in announcing that they are now the sole manufacturers under licence in U.K. of the complete range of the New Jersey Machine Corporation's PONY LABELRITE Labelling Machines. Able to perform a great diversity of labelling operations at speeds varying from 35 to 60 labels per minute, the PONY machine can cope with an amazing variety of sizes, shapes, in plain, varnished, lacquered or foil labels. Another version of this famous machine is the PONY LABEL-DRI. The original THERMO-PLASTIC Labelling Machine.

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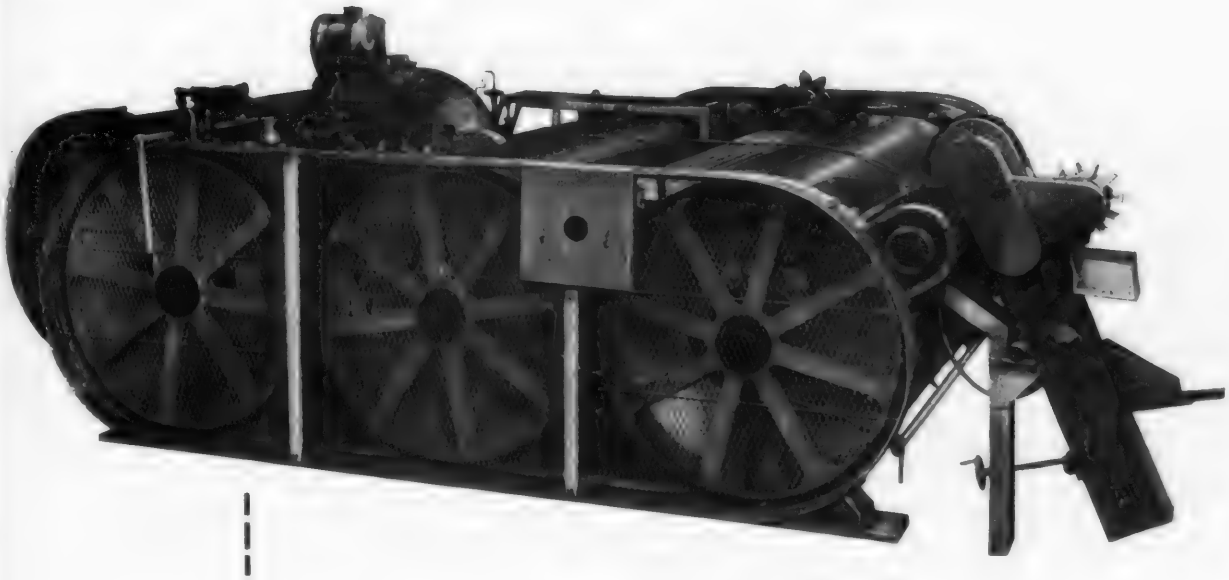

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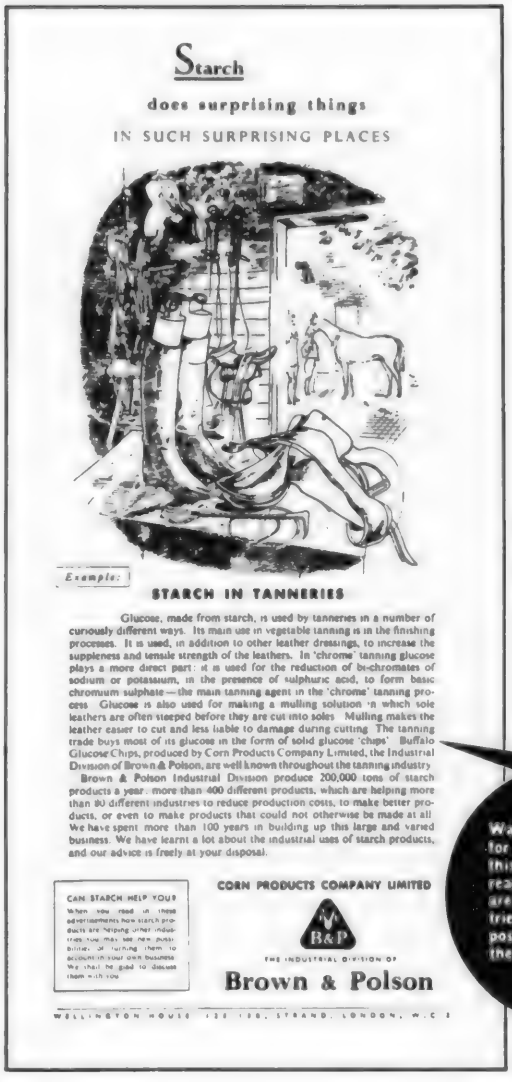
Starch
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IN SUCH SURPRISING PLACES
Example:
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Glucose, made from starch, is used by tanneries in a number of curiously different ways. Its main use in vegetable tanning is in the finishing processes. It is used, in addition to other leather dressings, to increase the suppleness and tensile strength of the leathers. In 'chrome' tanning glucose plays a more direct part: it is used for the reduction of bi-chromates of sodium or potassium, in the presence of sulphuric acid, to form basic chromium sulphate—the main tanning agent in the 'chrome' tanning process. Glucose is also used for making a mulling solution in which sole leathers are often steeped before they are cut into soles. Mulling makes the leather easier to cut and less liable to damage during cutting. The tanning trade buys most of its glucose in the form of solid glucose 'chips'. Buffalo Glucose Chips, produced by Corn Products Company Limited, the Industrial Division of Brown & Polson, are well known throughout the tanning industry.
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for you, in the Preserving Industry

Most jam manufacturers have encountered the problem of making jams that contain enough soluble solids to be satisfactory in quality, yet are not too sweet for their customers' taste and will not crystallise in storage. Most jam manufacturers are also aware that the best answer to this problem is to use less cane or beet sugar (sucrose) in their jams and make up the required soluble solids content with "Globe" liquid glucose.

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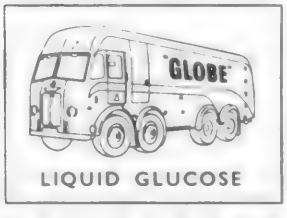

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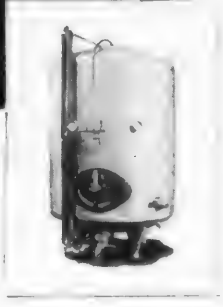

Top : A Jacketed Vessel in Stainless Steel.

Centre : A 720 gallon Stainless Steel Tank.

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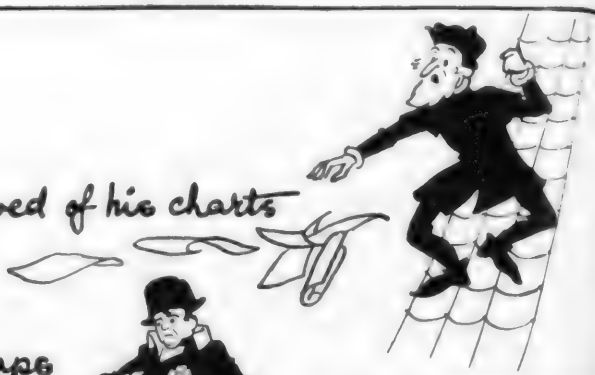
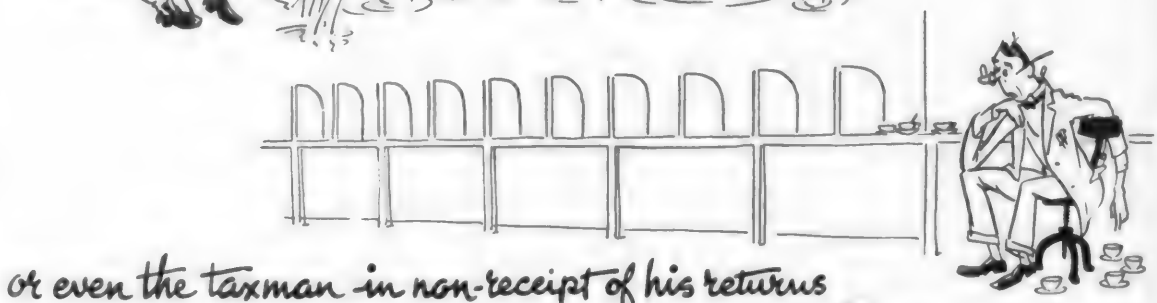
We can easily imagine

Christopher Columbus deprived of his charts



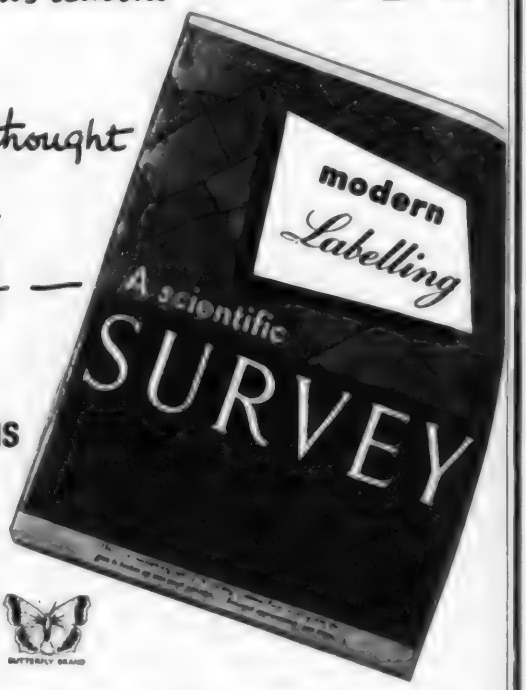
or Napoleon minus his maps

or Izaak Walton parted from his fly-book



or even the taxman in non-receipt of his returns

But
we are utterly shattered by the thought
of the Manufacturing Executive
without a copy of —



We therefore invite those
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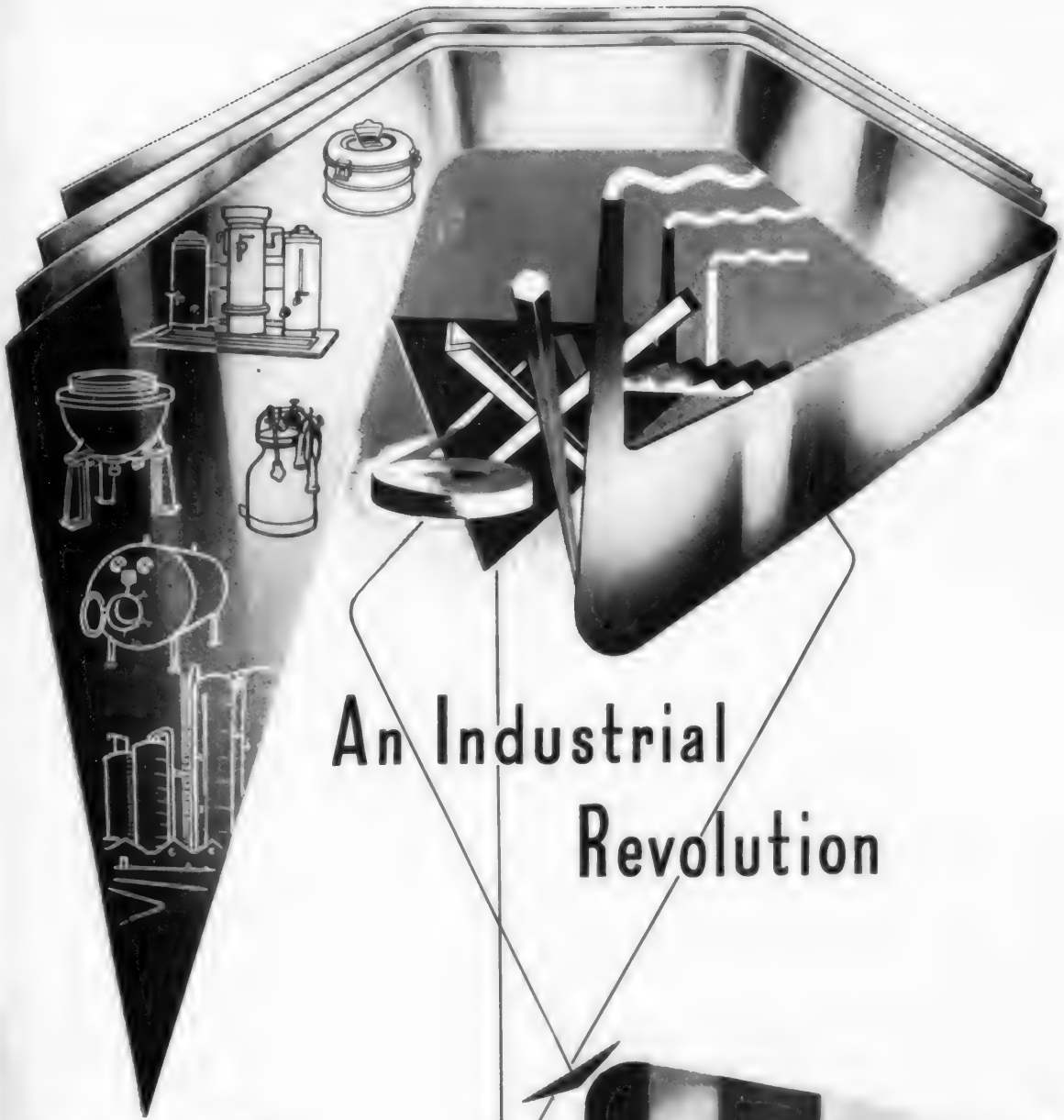

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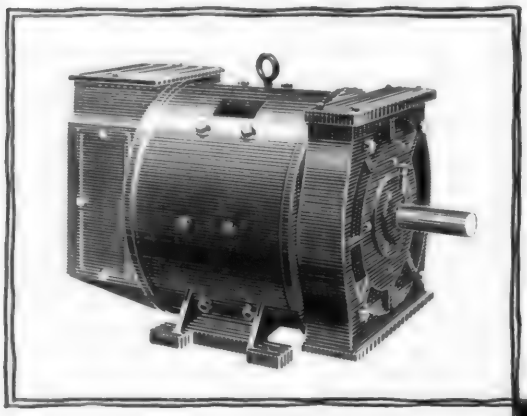
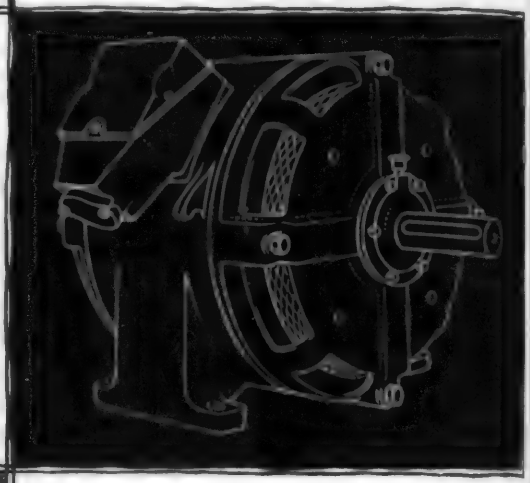
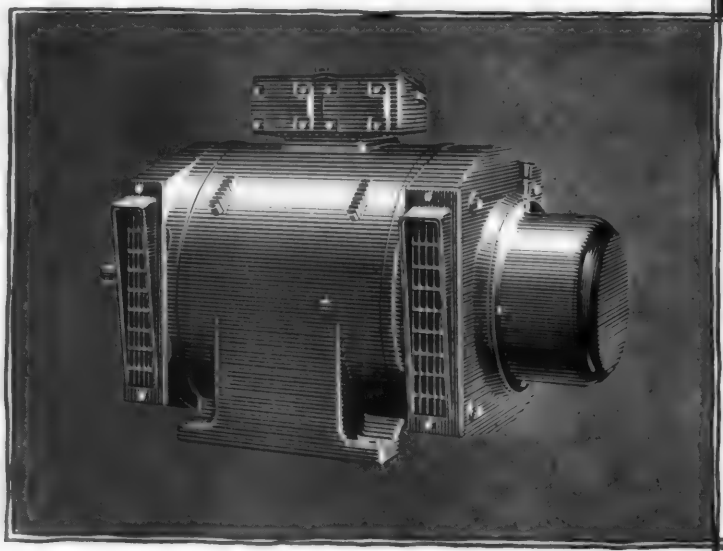


They bear

the name **G.E.C.**





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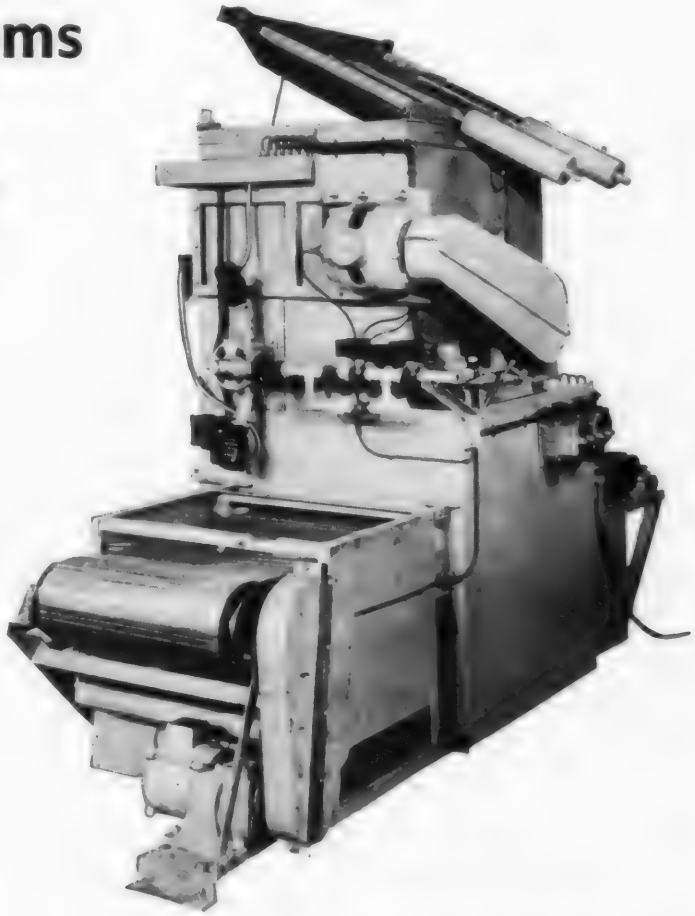
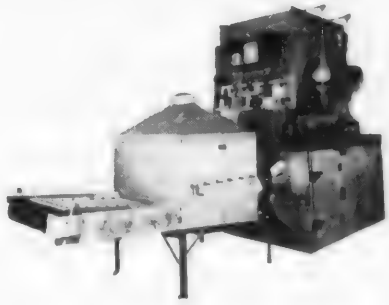
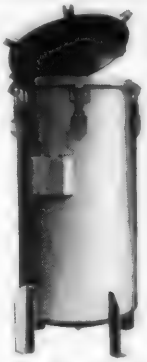


Small type HURRICANE OVEN as supplied to Messrs. DEWY and ALMY LTD.

Horizontal Retort 6' 0" x 3' 0" x 3' 0" with door closed



Major type HURRICANE OVEN as supplied to Messrs. DEWY and ALMY LTD.



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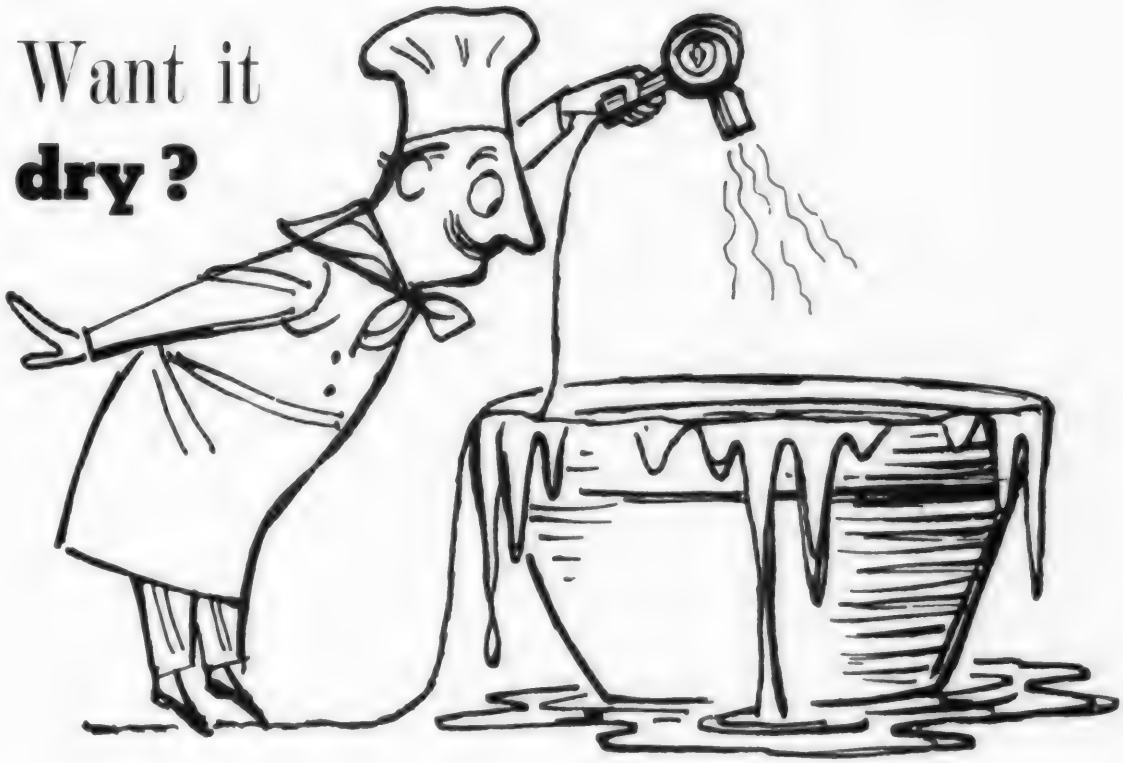

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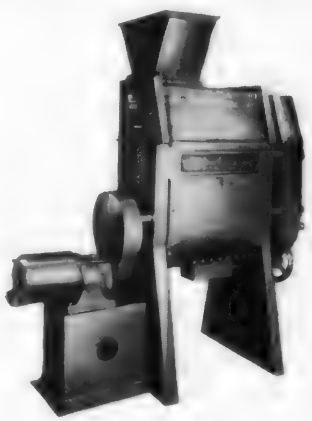

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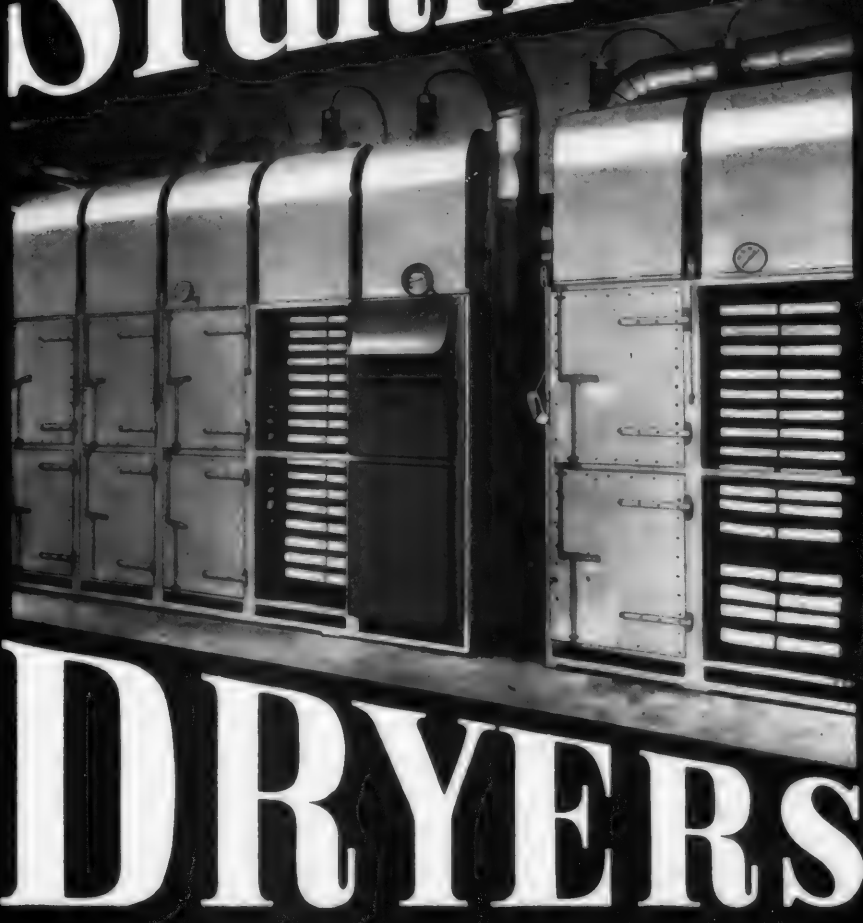

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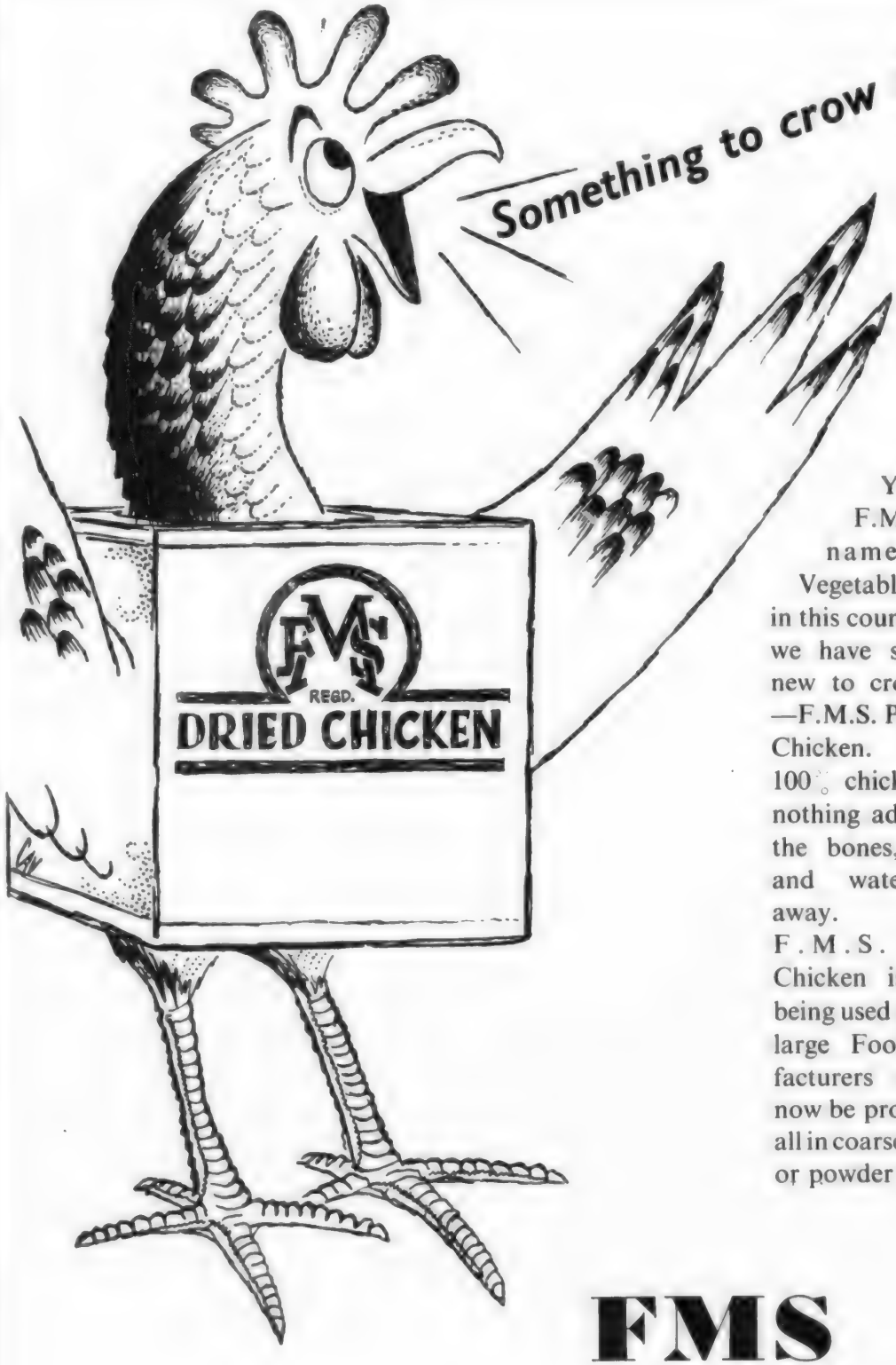

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FOOD MANUFACTURE

Vol. XXIX. No. 12 · Published Monthly · December 1, 1954

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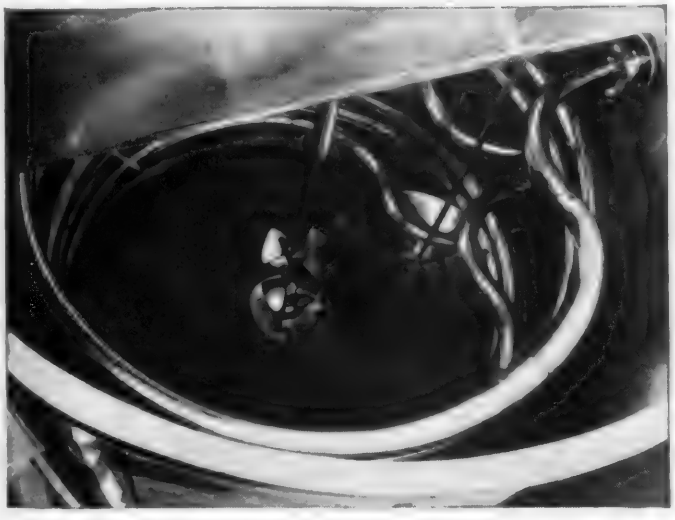
Gleaming Cleanliness



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FOOD MANUFACTURE

Vol. XXIX, No. 12 December 1, 1954

An Improved Meat Dehydration Process

DURING the war, New Zealand, at the request of the United Kingdom, established plants for the dehydration of meat. The dried mincemeat produced was used as part of the ration in combat areas where refrigeration facilities were not available and involved drying the pre-cooked meat on trays placed in a drying tunnel. The product was not easy to reconstitute, tended to have a gritty texture, and was no substitute for a steak or chop.

As one of the major meat exporting countries in the Empire, New Zealand was asked to continue research and, as a result, an improved method of dehydrating meat has been devised, and is reported in the 28th annual report of the N.Z. Department of Scientific and Industrial Research.

The method, which permits the drying of meat in slices up to half an inch thick, involves submerging slices of frozen meat in melted fat at 140° to 160°F. and extracting the moisture under vacuum. A pilot plant capable of dealing with 50 lb. of raw meat at a time has been constructed and operated satisfactorily to produce material for consumer trials. Both beef and mutton have been dehydrated satisfactorily and acceptability trials have been tried out by military and mountaineering personnel. Samples were taken by Sir Edmund Hillary on his recent Himalayan expedition to test keeping quality and acceptability under adverse conditions.

Tests to date have been very encouraging and a request has been received for five tons of the dried product for large scale consumer trials in the United Kingdom. The fact that the product can be stored without refrigeration means that it can be transported in unrefrigerated cargo ships, while the fact that it is dried reduces the weight and bulk of the material to be transported.

Jet-freezing for Poultry

FROM America come details of a jet-freeze installation for freezing poultry. The main problem in the development of this process was to find a means by which existing freezer space could be temporarily converted for use during the poultry season into an efficient quick freezing system. The economy and efficiency of this method have now been proved, and a daily quantity of 200,000 lb. of turkeys is now being handled in this pilot plant.

Some of the advantages of this system are: The high position of jet ducts allows off-season freezer-type storage without interference from the ducts; functional piling beneath the jet is done by fork-lift with no additional piling and positioning costs over ordinary fork-lift operations; with supporting racks of proper design, and when heat transfer is controlled by the product (as in the case of poultry freezing), a minimum air flow of 200-240 ft. per min. is satisfactory.

The system allows a very flexible piling pattern, with irregularity of height and the inclusion of various products in the same pile, provided proper pressure pockets are developed; defrosting operations do not have any noticeable effect upon the freezing process provided the temperature of the mean air blast is kept about 15°F. below the final freezing temperature required. Power consumption is very low, thus contributing to economy in operation and to a reduction of refrigeration requirements.

Development along these lines would no doubt be of great benefit to the British poultry and food processing industries.

Porridge Problems

WHY is porridge so insipid nowadays and what can be done to improve its flavour and its popularity? As part of a programme of research for the Oatmeal Millers of England and Scotland, T. Moran, J. B. Hutchinson, and J. Thomlinson of the Research Association of British Flour Millers are investigating the physics of kilning, and inevitably have also considered the problem of flavour. They have recently recorded (*Nature*, 1954, **174**, 458) that the desirable porridge flavour (often described as "nutty") has been consistently produced by careful control of the conditions of kilning.

The furnace gases, despite traditional belief, play no part, and the same flavour is obtained when the air is heated in an electric furnace. The optimum conditions correspond to the gentle drying of the oats down to an intermediate moisture content of about 8 per cent. followed by a short roasting for 20 minutes in a current of air at 150°C. These conditions are not absolutely rigid, and a slight increase in the tem-

perature can be compensated by a corresponding decrease in the time of roasting. The use of high air temperatures at the surface of the partly dried grain to obtain a short but severe heat treatment at the final stage of kilning is the essential feature. On crushing the grain, the pleasant aroma is immediately apparent. It soon evaporates from exposed meal, but the flavour is associated with less volatile material and accordingly is more persistent.

Other workers (*Cer. Chem.*, 1953, **30**, 22) have found that the aroma and flavour of bread are due largely to numerous organic substances produced in the crust at temperatures around 150°C. The substances thus produced range from the more volatile aldehydes, like furfural and pyruvic aldehyde, to the melanoidins associated with the browning reactions occurring in the crust. Similar reactions will occur in the kilning of the oats, since the outer portions of the grain reach the same temperature and also undergo slight browning.

However, there would appear to be other substances produced which are responsible for the unique flavour of oatmeal. Laboratory tests have shown that the optimum conditions of heating to produce flavour in oats also apply to groats, albeit there is less tolerance to over-treatment and a tendency for a slightly rancid flavour to be produced owing to the absence of the protective husk. On the other hand, the research workers at St. Albans have failed to produce the same characteristic nutty oatmeal flavour in wheat submitted to similar treatment.

Pure Food Drive in Mexico

FOR shipping 45 tons of "highly adulterated" honey to Germany, two Mexican companies have been expelled from the Federation of Chambers of Commerce and Industry and have had all import and export permits cancelled. This action on the part of the newly formed commission for the protection of Mexico's foreign commerce marks the opening of a fight against questionable and unethical commercial activities by some Mexican food firms who, if not directly engaged in adulteration, are guilty of slipshod methods in the production and packaging of food.

The first phase in this pure food drive is directed at flagrant violators in the food export field, but later the campaign is to embrace all branches of the food industry, when standards will come under thorough revision and failure to comply with them will force manufacturers out of business.

The present Mexican government is proving to be a tough administration for the get-rich-quick boys, but the reputable food manufacturer and exporter will welcome this determined effort to put the country's food manufacturing industry on a sounder footing whereby Mexicans and foreign purchasers alike will be assured of receiving pure products.

Nucleic Acid from Torula Yeast

IN recent years the paper industry has been giving a lot of attention to finding uses for its spent sulphite liquor, which ordinarily is a waste product difficult to dispose of. Perhaps the most notable achievement has been the production of Torula yeast by growing it in the liquor and thus utilising its rich sugar content. A further step, just announced, is the development of a commercial process for extracting nucleic acid from this yeast. Two American companies, Schwarz Laboratories Inc. and Rhinelander Paper Co., have co-operated in this venture and a subsidiary of the latter, Lakes States Yeast Corporation, has built the new plant for extracting the acid.

This news will interest workers in many phases of cell metabolism. Nucleic acid is essential for the growth and proper function of all living cells, and is therefore especially important in studies of growth and ageing. For many years it has been used as a tonic base in several European countries. With its derivatives and related substances, it is playing an increasingly important rôle in the investigation and treatment of disease. Nucleic acid is of particular interest, in combination with vitamins of the B group, in geriatric medicine.

Food Research in Australia

THE processing, preservation, and transport of foodstuffs are of great importance to Australia as a food producing country, more particularly as it is situated inconveniently far from the main food importing nations of the world and its own population centres are separated by long distances. The Commonwealth Scientific and Industrial Research Organisation's work on food is undertaken chiefly within the Division of Food Preservation and Transport and an account of the latest investigations is given in their Fifth Annual Report.

In the canning and fruit products section some of the investigations have been concerned with the development of a reliable test procedure for acid-resisting internal lacquers for cans. An acidified aqueous extract of beetroot tissue, containing the anthocyanin pigment betanin, showed promise as a test medium. Corrosion reactions in tinplate containers cause bleaching of the pigment and the extent of bleaching can be followed quantitatively.

The problem of sulphide staining in cans of food high in protein has prompted investigations on the liberation of labile sulphur from animal tissues during heat processing. A polarographic procedure is being used to determine sulphydryl groups and the rate of their disappearance on heating.

An experimental pressure spin-cooker has been constructed for processing canned foods in steam under pressure, the can being rotated axially during processing. The forced convection induced by this

rotation increases the rate of heating of the product so that the total cooking time is greatly reduced and the quality of the product is enhanced. The usefulness of the spin-cooking procedure has been demonstrated for acid foods, and it is now hoped, by means of the pressure unit, to extend the principle to the processing of low-acid foods such as vegetables.

In the field of dehydration, means of reducing moisture other than by air drying to low levels have been sought. One of these is the use of "in-package" desiccants. The drying agent, in its own package which allows transfer of water vapour, is enclosed in the container holding the dried vegetable. The prerequisites of such a desiccant include (1) high water adsorption at low relative humidities, (2) non-toxicity, (3) lack of flavour and odour, and (4) cheapness. Some bentonite clays possess these attributes, and samples of Australian clays have been obtained to compare with types in use in America.

Preliminary trials have resulted in satisfactory drying of sweet corn, sweet peppers, and green beans (stringless varieties).

New Wheat Types Developed

NEWS of the success achieved by the Cereal Division of Canada's Department of Agriculture in maturing three generations of spring wheat hybrids between September and April in a growth chamber in which light and temperature were controlled, and which had room for 1,000 plants, was given by Dr. K. W. Neatby at the jubilee conference of the Association of Applied Biologists in London.

This development in rapid breeding of new varieties of wheat means that if the first generation of a cross between two varieties was grown in the field during one summer, it was possible for the fifth generation to be sown the following summer. A growth chamber with space for at least 10,000 plants is to be constructed at the Cereal Breeding Laboratory, Winnipeg.

Another development announced at the conference concerned the design of an apparatus for testing the baking quality of wheats during breeding; it measures the expansion of balls of fermenting dough in weak solutions of salt. The design and construction of a miniature mill which will produce flour from less than an ounce of wheat is also being undertaken at Winnipeg.

Introducing New Food Lines

FOOD manufacturers who attempt to launch a new product are familiar with the apathy and resistance shown by retailers who, with notable exceptions, are reluctant to handle a line until consumer demand has been built up. This can be achieved by either a major advertising campaign (which ultimately adds to the price of the commodity) or a slow process of infiltration, and there is clearly a need for a new approach to the problem. It might be argued that this is not a manufacturing problem, but ultimately it is the concern of manufacturers, since production is conditioned by the ability to sell.

Several ways of overcoming the problem are being tested. Sampling at exhibitions is one method which is producing results; demonstration shows in retailers' own premises is another, but by and large this taps only a limited section of the potential market. In the interval production and development are held up awaiting fuller retail support.

Some firms favour a limited "sale or return" arrangement for introducing new lines and this possibility is worth study. However, many retailers are reluctant to adopt the idea, preferring to sell established and steady products rather than to give a fraction of their time to the promotion of new ones.

From the retail angle, it could be argued that there are far too many branded lines already and that what is needed is a reduction rather than an extension of the ranges.

Manufacturers, wholesalers, and retailers might well meet on common ground to discuss how new and acceptable food lines might best be given a trial run, on a co-operative basis. The solution of the problem will obviously present great difficulties, but the ultimate advantage to both trader and consumer would be considerable.

Electronic Bacon Curing

A NEW curing-smoking method employing electronic apparatus to deposit smoke particles on the meat and infra-red rays to heat the product has been devised as the result of experimental work conducted by Kingan Inc., of Indianapolis. In laboratory investigations bellies have been completely cured and smoked in 35 minutes.

The speeding up process has been largely achieved by "shortcutting" the standard cycle with its prolonged cure under refrigeration, followed by a slow heating and smoking, and concluded with a chill. The research workers investigated the possibility of streamlining the heating-smoking procedure into a compact two-step operation by which curing and heating would take place and smoke be applied to the product under controlled conditions.

According to the *National Provisioner* experiments have established that hot pickle injection, immediately followed by controlled infra-red heating, properly cures meat in the conventional meaning of the word. The colour and flavour development and preservative qualities imparted by the hot curing technique are at least as good as those achieved by conventional refrigerated curing. In fact, the hot-cured electrostatically-smoked sliced bacon retained its colour longer during storage in refrigerated dis-

play cases than did control samples of conventionally processed product.

The thickness of the meat has no bearing on the time required to deposit smoke on the product, as smoking under both the conventional and electrostatic techniques provides only a surface penetration. The degree of smoke flavour desired is controlled by the amount of phenols deposited upon the surface of the meat.

After electrostatic smoking, the product is again subjected to a brief infra-red ray heating to bring the surface temperature back to 200°F. and is held at this temperature for a minute. The product is then ready for conventional chilling. The total time required to cure and smoke a 12 lb. green belly with the new infra-red ray high temperature cure and electrostatic smoking technique is 35 minutes. Heavy bellies require several more minutes.

It appears that the findings are sufficiently complete and authoritative to warrant actual production installation and the manufacture of the appropriate electronic equipment is already under way. The new methods will lend themselves readily to continuous flow technique for meat curing and smoking and their use will result in reduced labour costs, since the product is handled only once after injection curing, reduced sawdust consumption, and the elimination of curing boxes and refrigerated storing space.

Fruit and Vegetable Processing in Holland

A CONSIDERABLE recovery in the processing of fruit and vegetables in the Netherlands has taken place since 1951, when a combination of factors, including tinplate shortage and the high prices of fresh produce, caused a sharp decline in activity. Last year the quantities of both fruit and vegetables taken by manufacturers established new records; this appears to have been due in the case of fruit to the return of apples to a position of dominating importance, particularly for juice manufacture. The recovery so far as vegetables are concerned has been most evident in the canning and dehydration sectors.

At present, there are some 300 plants engaged in the processing of horticultural produce in the Netherlands, of which at least 100 have an annual capacity of more than 275 tons of vegetables or 75 tons of fruit.

In addition to the fresh fruit absorbed by the Netherlands processing industry, considerable quantities of imported processed fruit are also utilised. In 1950, for example, these amounted to some 5,500 tons of pulp and 500 tons of other fruit products, mostly fruit in brine and dried peels and fruit.

Dutch exports of preserved fruit and fruit pulp showed some expansion in 1953 which was maintained in the first half of 1954. Canned vegetable exports, on the other hand, declined slightly in 1953, but showed a marked recovery in the first part of this year; brined vegetable and sauerkraut exports, however, showed a continuing decline during this period.

Exports of frozen fruit and vegetables, particularly the former, were higher in 1953; frozen fruit exports are not important in the first half of the year, but as far as frozen vegetables are concerned, a continued upward movement was apparent in the first half of 1954.

Christmas Fare

DURING the first weeks of December the British housewife's food planning is concerned mostly with the festive day, the two main items, turkey and Christmas pudding, being still more typical of our race than of any other in this gormandising on December 25. It is true that members of the American Turkey Federation at an Edinburgh poultry congress, wearing ties decorated with "old Turkey Cocke," tried to persuade the Briton to acquire a taste for turkey throughout the year. It is also true that at a Chesham turkey station special diets, batteries of egg incubators, and the use of artificial light have made possible the hatching and rearing of turkeys for all seasons rather than solely for Christmastide.

Yet the average Britisher thinks less of the species *Meleagris Americana* than of turkeys from Norwich, Cambridge, or elsewhere. An American bird it originally was; but how English it has become in December, this since times when Mr. Pepys dined well on one and Shakespeare referred to Pistol "swelling like a turkey-cock."

As for the Christmas pudding, times have changed since it included meats as well as fruit, when it was that "great Nostrum, Christmas Pye" composed of neats'-tongues and chicken as well as eggs, sugar, various peels, and "spicery." The heavy concoction of today may remind some of us of the French definition of a pudding: "*Une mélange indigeste et bizarre,*" particularly when the great soporific has dulled our wits after heavy portions.

For years we have seen "great raysyngs" imported at a price from Portugal and the Levant, as were currants or "Corinths" from Greece for the Englishman's "sweet pudding." Such exports to Britain reached five million pounds weight each year: hence the belief of people of Zante in the Gulf of Corinth that we not only made our puddings from them, but also fattened our pigs with them. No wonder old Thomas Roe groaned at our "great and needlesse consumption," and at Zante, "a little barren island that devours our money and returns nothing but a trash berry." Currants, raisins, and candied peel came to stay, however, with consumption at a peak in the last week of the old year.

Kenya Pineapple Cannery Cuts Down Waste and Raises Output

An increase in the rate of extraction from 23 to 47 per cent. has been achieved in less than three years by an intensive efficiency campaign in Kenya's biggest pineapple cannery at Thika, 20 miles north-west of Nairobi, which is operated by Kenya Canners Ltd. Practically one-quarter of the pineapple now goes in the can and much more is recovered before the waste is sold as cattle food. Kenya is now well on the way to leading the Colonies in canned pineapple production and present expansion plans should put the country ahead in the foreseeable future. The Thika plant was enlarged recently as part of a ten year project to treble its size and output; in the next five years some £124,000 is to be spent on new equipment and layout.

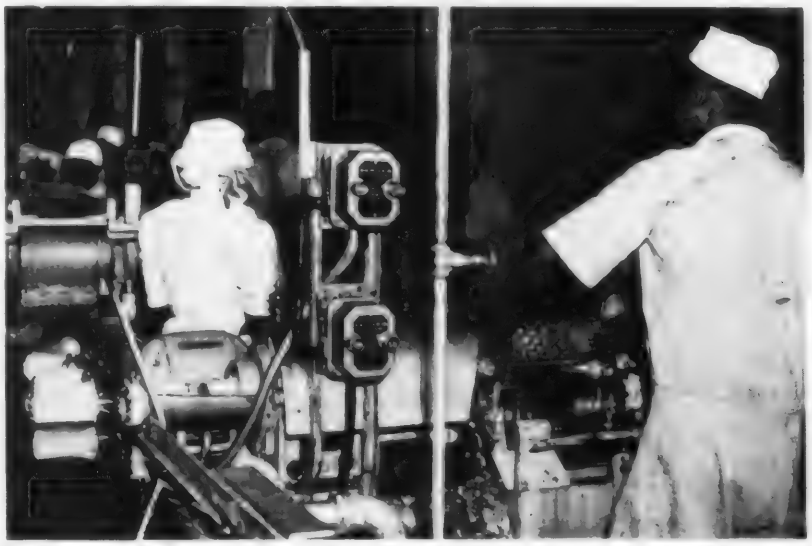
ABOUT 6,000 tons of pineapples enter the Thika plant every year, over 60 per cent. of which comes from African producers, mostly Kikuyu in the Kiambu and Fort Hall reserves, the balance coming from the European estates. About £100,000 per annum is paid out for the raw pines, representing a considerable cash income for the Kikuyu, most of whom operate through co-operatives. African co-operatives in the Kiambu district alone sold pineapples worth £20,000 in 1953, and this in the midst of one of the worst Mau Mau-affected areas of the Colony.

The Kenya Canners plant has benefited from the experience gained by its senior technical staff in other parts of the world, its present works manager having had experience of similar undertakings in Jamaica and Florida and previously assisting in setting up canneries in Scotland and South Africa.

One of the biggest developments in the Thika factory has been the increase in the rate of extraction from 23 to 47 per cent. in under three years. This is attributed to more efficient factory planning. Practically one-quarter of the pineapple now goes in the can, but much more is recovered before the waste pulp is sold as cattle food.

The factory is now producing the following canned varieties: slices (rings), pieces (segments), titbits, "fingers," and pulp for cooking and juice.

Kenya's Cayenne pineapple is well adapted to canning techniques and is considered to be one of the sweetest and tastiest of all varieties. They average around 3 to 3½ lb., but maximum sizes of



SKINNING.—Pineapples first of all go through this machine which cuts off the tough skins, leaving cylindrically shaped fruits.

TRIMMING.—The cut pineapples move along a conveyor belt to be trimmed to the size of one of the standard cans. After the ends have been sliced, the cylindrical fruits enter the slicing machine at the rate of 60 per minute for cutting into slices or rings. Blemished slices are removed for cutting into segments.

CAN FILLING.—The pineapple rings are placed in the cans by hand.

up to 6 lb. have to be catered for. Altogether the plant handles three main sizes of cans: No. 1 tall (16 oz.), A2 (20 oz.), and A2½ (32 oz.). A commercial pack holds 6 lb. of fruit.

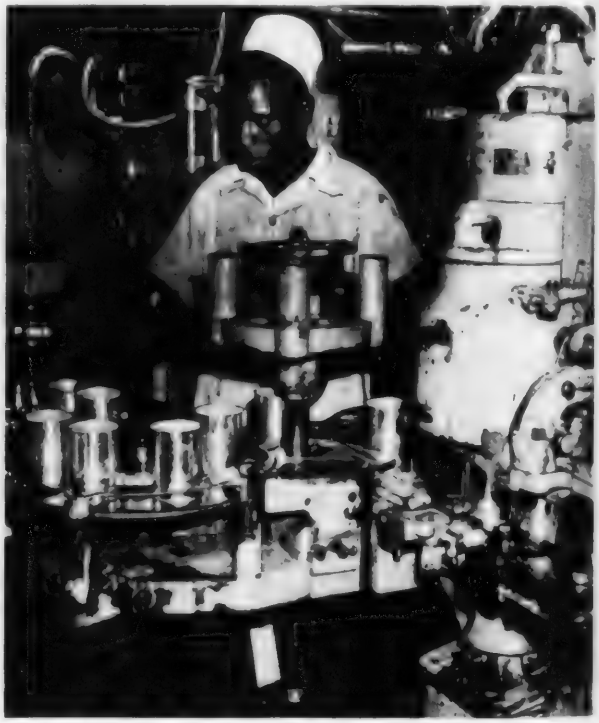
Processing Operations

In the first stage of the processing operations, the pineapples are passed through machinery handling 20 a minute for the removal of the skins. They are then cored and trimmed so that their outer diameter is reduced to one of the standard can sizes.

After the ends have been sliced by operatives, the cylindrical pines enter the slicing machine at the rate of 60 per minute for cutting into slices or rings.

Blemished slices of pineapples are removed for cutting into segments and sound ones are filled into the cans. After the syrup has been added from the battery of syrupers, the cans are sealed

SYRUP FILLING.—The filled cans are topped up with syrup from one of the factory's six syrupers.



CAN SEALING.—The filled cans are sealed by roller action in this machine at the rate of 62 per minute.

at the rate of 62 per minute. The plant is well served with cans from an adjoining factory.

Retorting of the exhaust-packed cans takes five minutes at 240°F. followed by cooling down to 140°F.

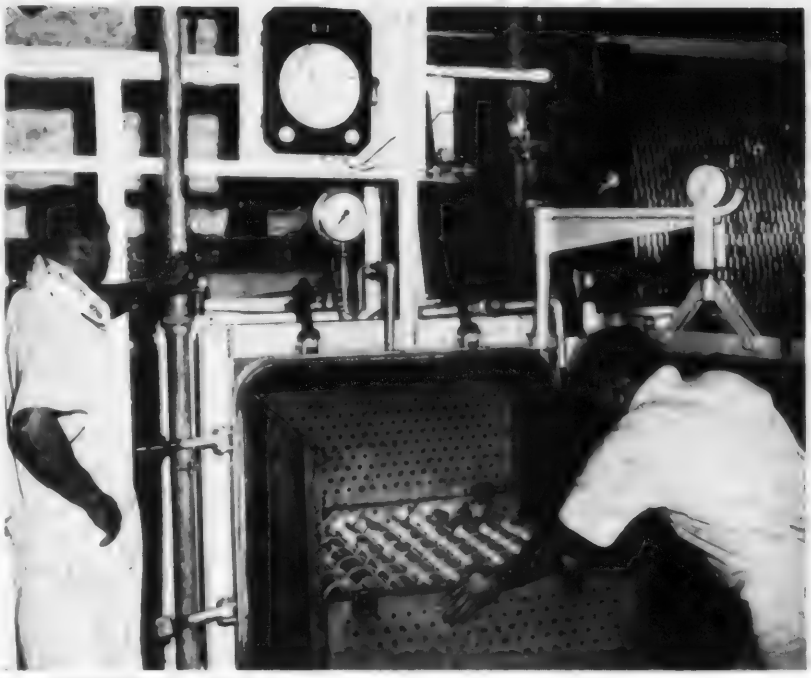
All cans are to be vacuum packed shortly and British-made machinery is being installed for this purpose.

Utilisation of Waste Products

From the skins peeled off in the first slicing and coring process, the flesh is separated by hand and canned as "fingers." Other "leftovers" are fed into a comminuting machine coupled to an extractor for the production of juice extract and pulp for cattle feed.

Extensive Canning Programme

Two fruit seasons keep the plant busy with pineapples for nine months of the year (July-October and February-June), the other three months being taken up with vegetable canning. So far the following varieties have been canned: green beans, lime beans, haricot beans, tomato juice, and sweetcorn. These vegetables are obtained entirely from African growers—some Kikuyu and some Wakamba.



RETORTING.—Cans of pineapples are steam heated to 240°F. for five minutes.

DESPATCH.—The cans are packed into cartons ready for shipment; 98 per cent. are exported, most going to Britain.

In the laboratory attached to the cannery, operating under a European chief chemist with four African assistants, acidity tests are carried out so as to regulate the sugar content of the syrup and achieve the correct balance.

The cannery is one of the largest employers of African female labour in Kenya. So far African women have not taken to industry in East Africa on the scale they have farther south, but Kikuyu and Wakamba women are proving adept at handling the pineapple processing machines. Altogether 260 African women and 150 men are employed, under a European technical staff of about 12.

About 98 per cent. of Kenya Canners' pineapple products are exported, most going to the United Kingdom, where they are marketed by associate firms. The next best customer is New Zealand. Despite its proximity to Australia and Hawaii, New Zealand favours Kenya pineapples. Other customers are in Scandinavia and elsewhere in Europe.

SOME SUPPLIERS OF EQUIPMENT

Peeling and coring machinery, syrupers, and extractors: *Food Machinery Corporation, California.*
Slicing machinery: *Anderson Barngrover.*
Seamer and cans: *Metal Box Co.*
Retort: *G. A. Harvey and Co.*
Comminuting machinery: *W. J. Fitzpatrick, Chicago.*

FOOD FORTIFICATION

Robert R. Williams

In this article, Dr. Williams, the distinguished American chemist and nutritionist, argues the case for the artificial fortification of food with vitamins, minerals, and other additives. He begins with an illuminating commentary on British and American views and disagreements on the subject and then describes current fortification practice in the United States. He believes that food fortification, imaginatively extended, may still provide an important means of escape from the dire predictions of Malthus.

THE earliest proposal for the artificial fortification of a nation's staple food was made by the British government during the perilous days following Dunkirk.* This decision, though never actually carried out in respect of British civilian supplies of flour, was a factor of considerable importance in persuading American scientific groups to consider the idea in America. By a perverse quirk of fate, the proposal was adopted enthusiastically by the American baking and milling industries, endorsed by the Food and Nutrition Board of the American National Research Council in May, 1941, and has come to apply during the past decade to about 80 per cent. of all of the white wheat products used in the United States.

Britain, by contrast, turned to the long extraction of flour from wheat and the only fortification of flour which is extensively practised is the required addition of calcium carbonate to offset the undesirable effects of the phytin of darker flours on calcium metabolism. Long extraction was encouraged in Britain on a voluntary basis beginning in 1941. The measure was, however, unpopular with the millers and bakers, who felt that the darker products were not attractive to consumers. It was not until April, 1943, that long extraction was generally adopted under pressure of a mandatory order of the Ministry of Food.

Under the conditions existing in the early war years in Britain there is little reason to question the wisdom of the government's decision. The threat of submarine blockade required the utmost efficiency in the use of shipping and the maintenance of maximum stores of food within her shores. The import of wheat as grain facilitated both transport and storage and long extraction afforded the maximum amount of human food from each bushel of wheat and still left a by-product of offals very much needed as feed for cattle and poultry. The prevailing opinion among American nutritional scientists is that the British government did an excellent job of feeding its people under difficult conditions. Particular admiration is expressed for the equitable rationing achieved among all classes of people regardless of income.

British scientific opinion on the other hand has often been intolerant of American policy of artificial fortification. Even the late Sir Jack Drummond, F.R.S., one of the original proponents of the fortification of flour with synthetic vitamin B_1 in Britain, severely reproved the Americans in several lectures delivered in the United States. More important in a practical sense has been British opposition in United Nations councils to projects for food fortification in other countries.

An analysis of this difference in viewpoints is somewhat difficult. Perhaps some of the British feeling of opposition arose from the controversy in the British Parliament and Press in 1941 concerning private profits which might have been made had British flour actually been enriched with vitamin B_1. There appears to be a stronger suspicion of the motives of industrial science among British academic scientists than prevails among university science groups in America, where the industries draw heavily upon the universities for scientific talent, and interchange of views and information between industrial and academic scientists is of daily occurrence. At all events a large vitamin industry has arisen in the United States producing hundreds of tons annually of each of the more important vitamins. Were the corresponding British industry of comparable magnitude and therefore in position to compete, the atmosphere might well be more favourable for industrial use of synthetic vitamins in foods.

The difference in viewpoints must be in large part ascribed to failure to appreciate the respective economic backgrounds of the two peoples. The introduction of the British policy on long extraction would never have been possible politically in the United States, where no threat of blockade existed and where almost unlimited opportunity was available for the expansion of food production as needed. No government could, under those circumstances, force on the people an unwelcome change in the flavour and appearance of a staple food in daily use.

We in America brought about a great nutritional improvement in our daily bread in the only way which was possible for us. The success of this measure was due to support by industry and academic science aided by the adaptable provisions of the Federal Food, Drug, and Cosmetic Act.

American Practice

The provisions of the Federal law and regulations are entirely permissive in nature rather than mandatory. White bread or white flour may be sold or bought in interstate commerce with impunity regardless of their vitamin contents.

If, however, a manufacturer chooses to label his bread or flour as "enriched," each pound of the product as sold must *contain* the following:

* T. Moran and J. C. Drummond, *Nature*, **146**, 117, 1940.

Required ingredients	*Flour minimum*	*Bread minimum*
Thiamine ..	2·0 mg.	1·1 mg.
Riboflavin ..	1·2 mg.	0·7 mg.
Nicotinic acid ..	16·0 mg.	10·0 mg.
Iron	13·0 mg.	8·0 mg.
Optional ingredients		
Vitamin D — U.S.P. Units	100	150
Calcium* ..	500 mg.	300 mg.

* Required ingredient in self-raising flour.

It should be noted that no *additions* are prescribed, that is, the prescribed *content* may be achieved through choice of natural ingredients or through addition of synthetics. In practice the use of synthetic additions prevails for reasons of both economy and convenience. The use of synthetics introduces no sensible change in colour or flavour and the cost of such enrichment is only about 6 cents per 100 lb. of flour.

Interstate commerce is governed in America by state rather than by Federal law. Twenty-six states, as well as Puerto Rico and Hawaii, have enacted legislation prohibiting the sale within their borders of white bread or white flour which does not meet the standard for the enriched products as above defined. These laws all likewise require *contents*, not *additions*. The states which do not have such laws consume the enriched products in almost, if not quite, as high a proportion as industry voluntarily supplies them at no additional cost to the consumer.

The term "enriched" has been criticised as being an exaggerated description of the improvement actually represented by the increased levels of only four nutrients. The term was the choice of the Federal Food and Drug Administration based on its definition of flour which had been in effect for about 25 years. This definition is that "flour" unmodified by descriptive adjectives to other purport means "white flour," as that was and has remained the staple form of flour. The darker flours are referred to as graham or whole wheat flour. The same terms apply to bread in common usage. The increased levels of the four nutrients in white flour or white bread are indeed a veritable enrichment.

Darker flours and breads are sold without restriction everywhere but make up only a small percentage of the total consumption.

The Author

Dr. Williams is chairman of the Williams-Waterman Fund for the Combat of Dietary Diseases and played a leading part in the synthesis of vitamin B_1. His parents were missionaries and he was born in Nellore, India, in 1886. He went to the U.S. for schooling and later took a B.S. and M.S. in chemistry at the University of Chicago. He then went to the Philippines, where one of his tasks was research on the beriberi vitamin. During World War I he was in Chemical Warfare and the Air Service of the U.S. Army. He joined the Bell System in 1919 and became chemical director of the Bell Telephone Laboratories in 1925, a position he held for 20 years. Research on vitamin B_1 continued as an avocation and culminated in the synthesis in 1936. The resulting patents, assigned to the Research Corporation, provided the Williams-Waterman Fund for the Combat of Dietary Diseases. Under its auspices, Dr. Williams went to the Philippines and China in 1946 to introduce a nutritionally improved form of rice for the correction of beriberi. He is chairman of the committee on cereals of the Food and Nutrition Board of the NRC and the recipient of many honorary degrees and awards.

The choice of the four nutrients as required ingredients of enriched flour and bread was based on medical testimony at formal hearings that these four nutrients were most frequently lacking in the then prevailing dietaries of the mass of the people. It is not particularly significant that most of the enrichment levels approximate the contents of these nutrients in the whole wheat grain. In the case of riboflavin, the enrichment level is about twice the amount supplied by whole wheat. This was done to compensate for low milk consumption in some areas, notably in the South, where consumption of cereals is relatively high.

The Federal Standards for enriched white flour and enriched white bread permit the further addition of vitamin D and calcium as additional optional ingredients. These optional ingredients have not generally been included or claimed on labels as a matter of practice, and present scientific opinion is inclined to question the usefulness of vitamin D in bread and flour. Calcium is added in the form of calcium acid phosphate together with sodium bicarbonate as leavening agent in half or more of the family flour sold in the South. Such self-raising flour is popular in areas where hot biscuits, freshly prepared before each meal, are a long-standing tradition. The calcium increment thus supplied is of major nutritional importance and it is fortunate that the hot biscuit regions are also regions where milk, the other principal source of calcium, is less used.

The enrichment of cereals has also been extended to corn meal and corn grits for similar reasons. These corn foods are especially popular in the South, where pellagra used to be prevalent. Corn or maize, even when used in the form of the whole grain, is deficient in nicotinic acid, a fact which has been partly responsible for the prevalence of pellagra. Nearly three-fourths of the corn products used as human food are now enriched to the same standard as flour.

Similar treatment of spaghetti, macaroni, and noodles is permitted by standards but is less generally practised. Likewise fortification of white rice has occurred only to a negligible extent except in Puerto Rico and Hawaii, where rice is a staple food. It is not such a staple in the continental United States, except in limited areas around New Orleans and Charleston, South Carolina. Such fortification, however, is thoroughly practical at a cost of about 12 cents per 100 lb. as has been demonstrated in Bataan, Philippines. This may become an important means for the eradication of beriberi in rice-eating Asia.

Margarine, Milk and Salt

Apart from the enrichment of cereals, the addition of vitamin A to oleomargarine is the most important food fortification in the United States. This is applied to nearly all the vegetable table fats sold in America but not to cooking fats. The competition of oleomargarine with butter has been greatly aided by this addition of 15,000 units per lb., a level approximately equal to that of good summer butter. Very little promotional effort by the Food and Nutrition Board and other public health agencies has been required.

The addition of 400 units of vitamin D per quart of milk has been endorsed by the Food and Nutrition Board and is becoming increasingly general. The need of growing children for vitamin D makes milk a peculiarly desirable vehicle for it. About half the liquid milk and a larger proportion of the canned milk sold in America is so treated, but there is considerable variation in the amount from one area to another.

Similarly the addition of iodine to table salt has been approved by the Board and is widely practised. However, about half the production of table salt is still not iodised.

Since its inception the Food and Nutrition Board has been alert to the danger that the food industry might overstep the bounds of propriety in the use of added synthetics. As early as October 1, 1941, it issued a statement of principles from which it has not deviated. These principles were reaffirmed in November, 1953, in the following words:

"(1) The board, within carefully defined limitations, endorses the principle of the addition of specific nutrients to certain staple foods for the purpose of maintaining good nutrition as well as for correcting deficiencies in the diets of the general population or of significant segments of the population. The requirements for endorsement of the addition of a particular nutrient to a particular food include: (*a*) clear indications of probable advantage from increased intake of the nutrient, (*b*) assurance that the food item concerned would be an effective vehicle of distribution for the nutrient to be added, and (*c*) evidence that such addition would not be prejudicial to the achievement of a diet good in other respects. These requirements have been met in the specific cases indicated in paragraph (6) below.

"(2) The board emphasises the desirability of meeting the nutritional needs of the people by the use of natural foods as far as practicable, and to that end encourages education in the proper choice and preparation of foods and the betterment of food production, processing, storage, and distribution so as to provide more fully the essential nutrients native thereto.

"(3) In order to avoid undue artificiality of food supply the board favours, whenever practicable, the choice, as vehicles for the distribution of additional nutrients, of those foods which have suffered loss in refining or other processing, and recommends that the nutrients added to such foods should preferably be the kinds and quantities native to the class of foods involved.

"(4) The addition of other than natural levels of nutrients to foods which are suitable vehicles of distribution may be favoured when in the judgment of the board the addition will be advantageous to the public health and when other methods for effecting the desired purpose appear to be less feasible.

"(5) Whenever technological and economic developments lead to extensive reduction in the consumption of a staple food, with a consequent nutritionally significant reduction in the intake of an essential nutrient or nutrients, the board believes that consideration should be given to the desirability of restoring such nutrient or nutrients to the dietary.

"(6) The board reaffirms its endorsement of the enrichment of flour, bread, degerminated corn meal, and corn grits, the nutritive improvement of whole grain corn meal and of white rice, and the addition of vitamin D to milk, of vitamin A to table fats, and of iodine to table salt."

The Chemicals-in-food Problem

The problem of chemicals in foods is one which the layman is likely to confuse with the addition of vitamins or other nutrients. The two are actually quite different in kind. Chemicals in foods are foreign substances added intentionally or by accident. Intentional additives may be legitimate and desirable for specific purposes such as stimulation of the growth of yeast in dough, prevention of mould formation in bread, or as antioxidants in milk. Accidental contamination of foodstuffs with residues of pesticides may be an inescapable consequence of living in a modern world where farm crops must give good yields or people will starve. In either case, however, the presence of these foreign substances must be scrutinised most carefully to control the kinds and quantities of them ingested within safe limits.

Vitamins and minerals are in a wholly different category. While synthetic vitamins are of artificial origin, the pattern of their chemical structures is derived from living things such as have formed the basis of the foods of animals and man throughout evolutionary history. They are therefore natural substances though artificially made; if they differ in any detail from the substances present in foods they are in general physiologically ineffective. Any attempt to classify the synthetic vitamins as chemicals in foods is the result of confused thinking.

Benefits in the U.S.

In the United States there is evidence of only a general character as to the benefits to public health which have resulted from food fortification. The period during which cereal enrichment and oleomargarine fortification were introduced was a period of rapid social and economic change due to the World War following a period of business depression. War production of military equipment and supplies and of foodstuffs was rapidly expanding to meet both domestic needs and those of our allies. This expansion was particularly conspicuous in the Southern States. The resulting higher employment led to general elevation of wages and a higher standard of living. Hence the effects of enrichment are intermingled with those of economic changes.

There is, however, universal testimony from U.S. clinics which serve low-income groups, both in

the cities and in rural areas, that the formerly prevalent symptoms of deficiency diseases have disappeared. It is no longer possible to find an adequate number of such cases for the purposes of instruction in our medical schools. It appears particularly significant that this decline in incidence is limited to those diseases which would presumably have been affected by those vitamins used for fortification. For example, no major decline in scurvy has appeared and it is reasonable to assume that this is due to the fact that vitamin C has not been included in the fortification programme.

In Newfoundland, the results of an equivalent enrichment of flour and fortification of oleomargarine are unequivocal as changes due to the war activity were less marked. In Bataan, Philippines, beriberi was substantially obliterated during a period of two years during which rice enrichment was maintained by subsidy. Only on August 24, 1954, was an Executive Order signed by President Magsaysay providing for systematic extension of rice enrichment throughout the Philippines during 1955-56. We must await the result of this first venture into systematic rice fortification which may mean much for the solution of the acute food problems of hundreds of millions in Asia.

Looking Ahead

The forms which food fortification formulae may take in the future will have to be adapted to the peculiar needs of each area. The addition of a proper selection of essential amino acids, produced by synthesis, can now be foreseen as a possible means of correcting the shortage of high quality animal protein which is perhaps the most outstanding affliction of half the population of the world. Such a development will require either a high degree of freedom of trade or establishment of elaborate chemical manufacturing in countries which are at present backward industrially. These obstacles, great as they are, seem far less insuperable than the shortage of land in densely populated areas such as India. Food fortification, imaginatively extended, may still provide an important means of escape from the dire predictions of Malthus.

Fruit and Vegetable Preservation in India

MANY representatives of the food industry were present at a symposium held at the Central Food Technological Research Institute, Mysore, when the problems of the food and vegetable preservation industry in India were discussed. Sixty-four papers were submitted under 10 sections, including some from Pakistan and one from Australia.

In the raw materials section, the need for horticultural development and for investigations to be carried out on the suitability of the different varieties of fruits and vegetables available in India for canning and preservation were stressed. Particular mention may be made of the survey on the utilisation of as many as 78 of the minor fruits and vegetables of South India. The cashew apple, though not a table fruit, is rich in sugars and vitamin C, and several products such as juice, syrup, and canned fruit in syrup have been prepared from it. The storage problems of canned foods in the tropical conditions of temperature and humidity were discussed and remedial measures suggested on the basis of experience gained in India. It has been shown that pectin derived from the citrus fruits largely grown in Punjab (Pakistan) can be substituted for gelatin derived from animal sources.

In the section on sanitation and microbiology, investigations on the intrinsic thermal resistance of different strains and species of bacteria causing spoilage of low acid canned foods were conducted.

Rôle of Additives

The rôle of additives has been elucidated; saffron and nutmeg were found to prolong the generation time of spore forming bacteria, and while the former activated pancreatic amylase in its digestion of starch, the latter proved to be generally depressing. The main source of infestation of cashew kernels by eight insect types, with measures to check them, and the common insect contaminations in fruits and vegetables were also discussed.

Salt Enrichment

A practical possibility of enriching common salt with ascorbic acid was demonstrated by dissolving salt in the juice of the Indian gooseberry (*Emblica officinalis*) and spray drying the solution. The resultant powder did not absorb moisture and lost 20 per cent. vitamin C on a six month storage, while canned loose jacket mandarin and tight skinned sweet lemons lost 14 to 16 per cent. of vitamin C during canning and 14 to 20 per cent. on storage for 15 months. Ascorbic acid has also been used to fortify fruit juice beverages.

A quick freezing method for obtaining better juice extraction from fruits has been developed and promises to have considerable practical significance. Studies carried out with mangoes, cashew apple, oranges, lemon, and the Indian gooseberry showed that 14 to 20 per cent. more juice could be obtained by quick freezing at −20°F. and subsequent extraction. The application of refrigeration for the storage and transport of fruits and vegetables in Queensland, Australia, was discussed in a paper.

A new enamel, prepared from cashew nut shell liquid, has been found to make a satisfactory lining for containers used for the storage of edible oils, shortenings, and preserved fruits.

The design and construction of evaporators for the production of fruit juice concentrates and driers for fruits and vegetables were also described.

In the general section it was pointed out that high quality and low cost should be the hall-marks of the preservation industry and that modern machinery and rationalised methods should be used. Among other contributions were those concerned with the preparation of preserved products from the jack fruit, banana, passion fruits, guava, tender bamboo shoots, and fruited cereals.

Fig. 1. Master starch machine.

Starch-filled Confections

AMERICAN GUM DROPS

C. T. Williams

Interest is reviving in Britain in the production of American A.B. Gums, or gum drops, a sweet which has long been popular in the United States. For many years before World War I, this confection was imported into Britain packed in wooden barrels and pails, the bulk for repacking into smaller containers and the pails for sale in multiple retail grocery houses. The renewal of interest in starch as a gelatinising agent may be the result of the high cost of gelatin and other colloids, but the palatability of the gum drop of itself is sufficient to justify production on a considerable scale.

STARCH-filled goods is the name usually given to A.B. Gums, their variants, Jelly Beans, Orange and Lemon Slices, and their distant relative, Turkish Delight, indicating that the gelatinising agent employed in their manufacture is basically some form of starch. The description distinguishes this class of "gum" work from that in which agar-agar, gelatin, natural gums, and pectins are used to produce gums and jellies, perhaps bearing similar names.

The technique of starch-filled goods production varies slightly according to the type of starch employed, several types of modified starch having been evolved to facilitate manufacture and to improve the final product. These are known under the generic heading of "thin boiling" starches. Briefly, corn starch is subjected to an acid treatment resulting in the reduction of the hot paste viscosity. This process has the effect of increasing the gelling power of the modified starch, subject to several variable factors employed during conversion.

Fluidity Values

During the actual gelatinisation process, thin boiling starch granules do not swell so much as those of untreated starch, and appear to disintegrate into smaller particles, thus assisting reduction in viscosity. Fluidity values are measured by means of suitable instruments, one of which is the Scott viscometer. The fluidity value is the measure of the hot paste viscosity of a cooked starch, the method of determination being briefly as follows:

A quantity of starch at known *p*H is stirred to a slurry with 280 ml. of distilled water in a German silver beaker. This beaker is placed in a boiling water-bath, in which, with stirring, the starch is gelatinised and heated for 15 minutes. At some definite and standardised period of time prior to the expiration of the heating period, 200 ml. of the paste are transferred to a Scott viscosity cup also in the boiling water-bath. Usually two minutes are allowed for the paste to stand in the Scott

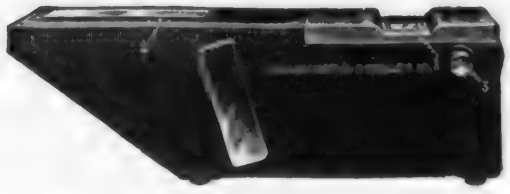


Fig. 2. B.-S. projection refractometer for testing the end point of a batch of gum drops in order to ensure uniformity of hardness.

cup. At the end of the total elapsed heating time of 15 minutes, the plunger valve closing the orifice on the base of the cup is raised, and the time in seconds noted for a given volume of paste to fall into a graduated cylinder. The time, in seconds required, is the specific Scott test viscosity of the starch sample.

The following are the Scott viscosities of the special modified starches mentioned in this article:

Acid-modified starches.
- *Eagle 4-star thin boiling starch.* Scott 28·35 g./280 ml. = 38/43 seconds.
- *Hudson River thin boiling starch.* Scott 28·35 g./280 ml. = 60/65 seconds.

Oxidised modified starch.
- *Amisol No. 6 thin boiling starch.* Scott 100 g./280 ml. = 45/50 seconds.

Oxidised modified starches possess certain advantages over acid-modified starches: (*a*) retrogradation is much slower, hence their stability is greater, which reflects itself in the shelf-life of the finished goods, (*b*) a higher degree of clarity of solution is obtained, resulting in brighter sweets, and (*c*) oxidised starches, unlike acid-modified starches, are washed, and are, therefore, free from residual salts of the reaction.

Need for Complete Gelatinisation

In the production of satisfactory starch-filled confections, it is essential to obtain efficient "cutting," *i.e.* the complete gelatinisation of the starch, which is added to the batch in the form of a slurry with water. The "cutting" is accomplished by the slow simmering at just above gelatinising point, 180°F. for oxidised starches, and 190° to 200°F. for acid-modified starches, the object being conversion of the starch into a viscous fluid of the maximum clarity. Immediate rapid cooking results in pasty goods of indifferent appearance. However, once the point of complete gelatinisation has been reached, cooking may be accelerated with impunity and indeed is necessary to prevent caramelisation.

A further essential is the liberal use of water to prepare the starch slurry. This allows adequate cooking time for the full bursting of the starch cells. The usual proportion is approximately six to 10 parts of water to one pint of starch.

Cooking and Moulding

Cooking is normally carried out in steam-jacketed pans fitted with stirrers and scrapers, which keep the mass in motion and prevent the building up of a coating on the sides of the pan and hindering heat transfer. The cooked batch is finally drawn off or pumped away from the pan, according to the type of equipment used, and transferred to depositors, which are integrated in the modern starch machine combinations (Fig. 1).

The mass is deposited into impressions made in corn starch contained in shallow trays, which are transferred to hot-air chambers to eliminate a percentage of the contained moisture in the gum drops. The final moisture content of gum drops should be 19·0 to 19·5 per cent. The drying chambers must be thermostatically controlled to achieve the hardness required in the finished goods.

For the highest efficiency, the pre-heated, dehumidified air passing through the insulated chamber should be in constant motion, the moisture-saturated air being drawn out by exhaust fans suitably placed. The temperature of the air entering the drying chamber varies from 120°F. to 150°F. It is advisable to make periodic checks of the relative humidity of the air at inlet and outlet points of the drying chamber by means of dry and wet bulb thermometers placed in the air stream. The figures obtained would be studied in relation to tests made at the same time of the weight of materials before and after drying.

Careful control of the condition of the corn starch used for the moulding process is essential for the production of first-class work. Damp or contaminated starch will give rise to indifferent goods, so it must be dried and sieved at regular intervals to keep it in good condition. Generally, the maximum moisture content of moulding starch should be 7·5 per cent.; the maximum impurities 5 per cent., and maximum total oil 2 per cent.

Testing the End-point

In the past, the testing of the end-point of a batch of gum drops was indicated by the "string" test. This was done by dipping a wooden or metal spatula into the batch and noting the appearance of the mass dripping from the spatula. A weak, medium, or strong "string" would indicate to the skilled operator the degree of firmness expected in the finished product. A weak "string" would result in a jelly, medium "string" in a pastille, and a strong "string" in a gum drop. This method, which was successful when carried out by an operator of long experience, is now superseded by a refractometer test. A small amount of the batch to be tested is smeared on the plate of a projection refractometer (Fig. 2), and the total solids content noted. The use of this scientific instrument should ensure uniformity of hardness if performed correctly.

Ingredients and Formulæ

The basic ingredients of gum drops and all starch-filled confections are sugar, liquid glucose, and modified starches. Formulæ may be varied by the use of cerelose (powdered glucose), invert sugar, cream of tartar, and citrus acids. Cerelose (powdered glucose), when replacing a portion of the granulated sugar content, renders the cooking batch thinner, thereby facilitating the deposition of the liquid batch into starch impressions. It also has the effect of maintaining a tenderness in the structure of the final product.

The following are typical and successful formulæ and methods for the production of gum drops:

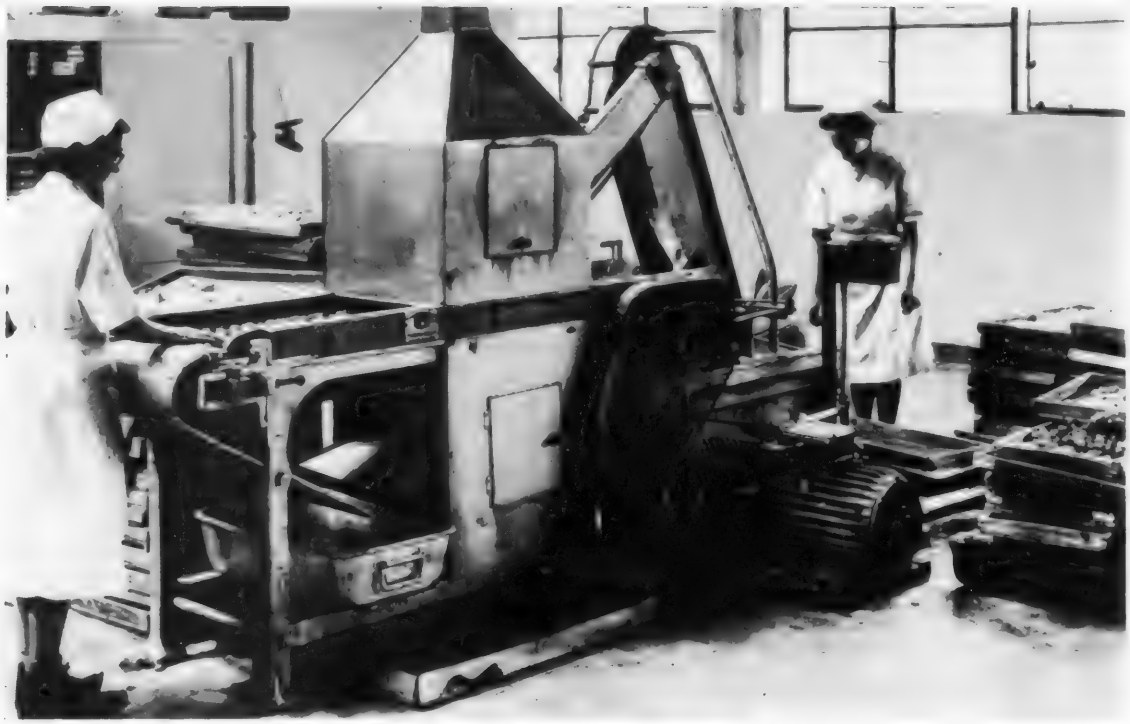


Fig. 3. B.C.H. sugar sanding machine.

The illustrations for this article have been reproduced from "Chocolate and Confectionery" by C. Trevor Williams, published by Leonard Hill Limited, Stratford House, 9, Eden Street, London, N.W.1.

Gum Drops (Fruit)

Granulated sugar ..	24 lb.
Globe 3A glucose ..	24 lb.
"Eagle 4-star" thin boiling starch	6½ lb.
Water	6 Imp. gal.

The sugar, glucose, and two gallons of water are placed in a steam-jacketed stirring pan. The pan is heated so that the sugar is completely dissolved. Meanwhile, the starch is mixed to a slurry with the balance of water, and poured slowly into the heated batch at a rate which will not lower the temperature below simmering point. When the starch slurry has been added, the batch is allowed to simmer at 190° to 200°F. for 15 minutes. Cooking is then accelerated and continued until a strong "string" is obtained by the manual test or 75 per cent. solids are shown on a refractometer. The heating is then stopped, flavour and colour added, according to requirements, and the batch pumped to the depositor of the starch machine, by which it is deposited into impressions in prepared starch in trays. The filled trays are transferred to the drying chambers, and allowed to remain for three to five days at a temperature of 120° to 150°F., according to drying conditions.

When the gum drops have reached the point at which they contain 19 to 19·5 per cent. moisture, they are taken from the drying chamber, allowed to cool down to room temperature, then passed through the starch machine for brushing free of starch. Finally, they are passed through a sugar-sanding machine (Fig. 3), allowed to dry for a further period, and packed.

An all-glucose gum drop, known as American A.B. No. 1, may be produced from the following formula. As previously mentioned, a proportion of the liquid glucose may be replaced with cerelose. This is a matter for the manufacturer to decide according to the texture of product he wishes to achieve.

Gum Drops (American A.B. No. 1)

Globe 3A glucose ..	33 lb.
"Eagle 4-star" thin boiling starch	4½ lb.
Tartaric acid	3 oz.
Water	7 Imp. gal.

The glucose is boiled with three and a half gallons of water, and a starch slurry is prepared with the balance of water. The procedure is identical to that described for the previous formula. Half the amount of tartaric acid, dissolved in a little water, is added to the batch after the 15 minute simmering period, and the balance just prior to the end-point. The batch is tested by refractometer, deposited in impressions in starch, and subjected to the drying process. It is finally sugar-sanded and packed.

Of particular interest is a plant evolved by an American engineering company for the automatic continuous cooking of starch-filled confections. This is the Votator heat transfer unit, by means of which substantial economies can be effected in time of cooking, floor space, fuel, and starch trays.

Briefly, the unit consists of a set of 6 in. cylinders, jacketed and fitted with a closed heat transfer mechanism. The pre-mixed batch, heated to 180°F., is pumped into one cylinder in which it is cooked rapidly to 280°F. It is then passed, under pressure, to a water-cooled cylinder in which it is cooled to 200° to 205°F. Flavours, colours, and citrus acids are added in a special mixing device, and the batch pumped to the depositors. The final firmness of the starch-filled goods is regulated by the cooking temperature.

Acknowledgments are tendered to Corn Products Co. Ltd., London, and the Manufacturing Confectioner U.S.A.

Evaluation of Cake Flours

R. Bennett, B.Sc., and J. J. Devlin
British Baking Industries Research Association

Since decontrol of flour milling during the past year, there has been renewed interest in flours for cake making. This has centred particularly on the "special" cake flours of the type introduced before the war primarily for making high ratio cakes, that is cakes of a very light nature containing a higher amount of sugar and liquor than flour. Such flours have also been used in some of the ordinary types of cake. Considerable information is available about the characteristics of flour for cakes, but there is still far more to be found out. In view of the need for co-operation between chemists and bakers, this paper, presented at the British Cake and Biscuit Association's Technologists' Conference, will be of particular interest.

IN the case of bread, laboratory tests have been established, especially the physical tests on dough, from which the baking properties of the flour can be predicted with a good degree of accuracy. They agree with small-scale test baking procedures which in turn can be related to commercial production.

In the case of cakes, this does not apply. The problem therefore is:

1. To standardise test baking procedures for the main types of cake, *e.g.* Madeira, sponges, and high ratio cakes.
2. To ensure that these procedures are comparable with large scale commercial practices.
3. To relate laboratory results to the practical baking behaviour of the flours.
4. To find more precisely which flour characteristics are required for different types of cake.

Review of Literature

In the 1930's, the Americans were evolving their test baking procedures and, at the same time, were trying to standardise cake flours. Some of their work does not apply in this country owing to the differences in types of cake, but many of their findings have considerable bearing on our present problems.

A point made by Bailey and Le Clerc[1] in 1938 and by Wade and Coughlin[2] in 1941 is that flour that is inferior in one type of cake may be quite satisfactory in another. The problem therefore becomes more complex when it is necessary to specify the type of flour for each type of cake.

Soft Winter wheat flour and high grade flour were considered excellent by Bailey and Le Clerc[1] and the use of these types of flour was found to be most important in Angel cake and not so important in "gold" cakes, while pound cakes were more tolerant to flour variations.

The importance of fine granulation has been stressed by several workers. Bohn[3] reported in 1934 some detailed work on granulation. A bulk sample of clean middlings was divided and then milled lightly and repeatedly to pass through 9xx, 12xx, 15xx, and 18xx silks. The quality of the cakes improved with increasing fineness. In pound cakes, however, the finest flour only gave the best results when treated with chlorine, *i.e.* the untreated flour could be too fine. Bailey and Le Clerc[1] also found that Angel cakes demanded finer flour for best results than "gold" and pound cakes.

Hanson[4] and others have stated that ruptured starch is to be avoided. This means that fine granulation must not be achieved by heavy grinding. Starch gel strength is important. The strength of the gel is dependent on the size to which the granules swell and the volume which they occupy as compared with the total volume in which they are suspended. Gel strength therefore is associated with the number and size of the starch granules in the batter emulsion. This is a separate consideration from the granulation size of the flour.

The effect of the *p*H of the batter has been studied by Bailey and Le Clerc,[1] Bohn,[3] Smith,[5] Montzheimer,[6] Stamberg and Bailey,[7] and others.

In general, treatment with chlorine with 1 per cent. nitrosyl chloride at levels to bring the *p*H of the flour to 5·4 to 5 improved baking qualities. For Angel cake, *p*H 5 to 6 could be achieved to advantage with additions of citric, lactic, or acetic acids or by lemon juice. At *p*H below 5 adverse acid flavours are evident. Yellow and white layer cakes gave best results at *p*H 7 to 7·9 achieved by adjustment of baking powder levels. Bleaching treatments other than chlorine were not effective.

Hall[8] makes some interesting remarks on the non-gluten constituents of flour. Compared with bread dough, a cake batter contains only one-third of the amount of dried gluten, and at this dilution, gluten formation is not apparent; it cannot be washed out from a cake batter. The non-gluten flour portion forms one-quarter of the total batter and a cake-like texture can be produced from starch without any gluten. Yet another point of difference in bread is the very much greater degree of gelatinisation of the starch in cakes. High water imbibing power and high swelling power of the non-gluten flour portion gives high viscosity of the batter and desirable cakes. This quality is found more in soft wheat flours than in hard wheat flours.

Laboratory Tests

The tests normally applied to flours in the laboratory include: moisture, protein, maltose figure, water absorption; dough quality tests for resistance to being stretched and extensibility; viscosity of the treated flour paste in the Brabender Amylograph; sieving test for granularity.

It is necessary to decide how far these tests are significant in evaluating flour for cake making, or

whether other tests should be devised to measure some essential characteristics of the flour not already covered.

Moisture is desirable from an economic point of view. Protein is important because it is one indication of the type of wheats from which the flour has been made. We think that low protein is desirable in flour for the high ratio type of cake, or perhaps it should be said conversely that a high starch content is desirable. For the Madeira type of cake, the protein content of the flour may not be of such importance. Perhaps it is because we are so accustomed to this figure that we are reluctant to omit it.

The maltose figure is of doubtful value and there are many differences of opinion regarding its application.

A water absorption test made on the dough again serves to characterise a certain flour, though in itself it has little bearing on the cake batter absorption in which, as was mentioned earlier, gluten formation does not occur.

Similarly, dough quality tests are useful to identify flour. These tests may be made on the Chopin Alveograph, the Simon Extensometer or the Brabender Farinograph, and Extensograph. If it is found by experience that a certain flour gives good cakes then these tests help to identify a similar flour again; they also show the effect of heavy chlorine treatment, such as is given to high ratio flours. It is the gluten quality that is the major factor in these tests, and in cakes present ideas are directed towards the non-gluten fraction being of major importance.

The Amylograph might be considered more applicable. The test corresponds to the behaviour of the batter in the oven. In contrast to dough tests, a much thinner batter, *i.e.* more water to flour, is used than in cake making. A flour water batter is used without the influence of the fats, sugar, and eggs in a cake batter which have an effect of gelatinisation. Nevertheless, it does appear to be a useful test for giving additional evidence on probable behaviour in cake baking. With further experience, other techniques may be devised for the use of the Amylograph.

Granulation is certainly important, and fine flour is preferable to coarse. It has been suggested that particle size should be between 30 and 60μ ($1\mu = 1/1{,}000$ of a mm.), and the greater part of such flour should pass through a 25xx silk. Sieving over a nest of sieves of decreasing fineness is the simplest guide to granulation. Other methods involving the sedimentation of the flour in an inert liquid (*e.g.* benzene) have been devised for more accurate measurement.

Baking Tests

The standardisation of test baking procedures for cake flours presents formidable difficulties. Besides the flour which is under test, there are other variable factors. The fats can differ in their creaming performance and emulsifying powers. The sugar may vary in its granularity; the quality of the eggs or egg white has a profound effect upon the results of the test, while temperature, timing, manipulation, depositing, and the conditions of baking again affect the results of the test bake. The mechanical efficiency of the mixing machine, with particular reference to speeds and the amount of clearance between the beater and the bowl, is important. Batters baked in papered tins may show effects different from those baked in greased tins.

Although this list of variables is extensive, the most important factor of all is the actual choice of the recipe. It can be readily demonstrated that a flour might give excellent results with one formulation but poor results in a differently balanced recipe. Finally, the test is dependent on the skill of a trained operator. This is particularly evident at the scraping down and the final clearing of the batter; work done by the hand at this stage can affect the baked cake.

Despite these qualifications, the performance of a flour in making a cake is the ultimate test on which judgment of the quality of the flour is based and it will continue to be so until more informative laboratory tests have been devised.

The following are the particulars and methods used for testing cake flours:

Equipment

(*a*) A room maintained at 70°F.

(*b*) A 10 qt. cake machine fitted with a beater. The speeds of the rotor arm were as follows:

Low speed:	62 r.p.m.
Medium speed:	110 r.p.m.
High speed:	185 r.p.m.

The revolutions of the beater to the rotor arm were in the proportion of 7:3.

(*c*) Cake hoops, 5 in. in dia. $2\frac{1}{2}$ in. deep.

(*d*) 1 lb. bread tins measuring $3\frac{1}{4}$ in. × 6 in. × 3 in.

(*e*) Sponge sandwich tins 5 in. in dia. 1 in. deep.

(*f*) Gas-fired oven 4 ft. × 4 ft., thermostatically controlled.

All ingredients were brought to 70°F. before starting.

Recipes:

Madeira (Best Quality):

	lb.	oz.
Cake margarine		14
Compound fat		2
Caster sugar	1	–
Defrosted whole egg	1	4
Flour	1	1
Baking powder		$\frac{1}{2}$
Milk	–	–

Method. — The sugar batter method was used. Fats and sugar are creamed on second speed for a period of 15 min. The eggs are then added gradually over three minutes until fully incorporated. The flour containing the baking powder is then blended through by hand until clear. The batter is then scaled at 14 oz. and baked at 375°F. for 50 minutes.

Madeira (Medium Quality).

	lb.	oz.
Cake margarine		12
Compound fat		6
Caster sugar	1	12
Defrosted whole egg	1	12
Flour	3	–
Baking powder		$\frac{3}{4}$
Milk		14

Method.—The method used was as for best quality, the milk being added after partly clearing the flour.

Sponges (Best Quality):

	lb.	oz.
Defrosted whole egg	1	4
Water	–	–
Caster sugar	1	–
Flour	1	–
Baking powder	–	–

Recipes Based on Flour as 100 Parts

	Madeira		*Sponges*		*High Ratio*	
	Best	*Medium*	*Best*	*Medium*	*White Cake*	*Yellow Cake*
Cake margarine	70	25	—	—	—	—
Compound fat	10	12·5	—	—	—	—
Special fat	—	—	—	—	50	50
Caster sugar	80	58·3	100	100	120	125
Whole egg	100	58·3	125	62·5	—	75
Water	—	—	—	62·5	68·7	50
Flour	100	100	100	100	100	100
Sep. milk powder	—	—	—	—	10	10
Baking powder	0·6	1·5	—	1·5	5·3	3·7
Cream powder	—	—	—	—	0·0	—
Egg whites	—	—	—	—	62·5	—
Liquid milk	—	20	—	—	—	—
Salt	—	—	—	—	1·2	1·2

Method.—The eggs and sugar were whisked for 7 min. at top speed. The sieved flour and baking powder were then blended through by hand until clear, the batter being then scaled at 6 oz. and baked at 420°F. for 15 minutes.

Sponges (*Half Egg*):

	lb.	*oz.*
Defrosted whole eggs ..		10
Water		10
Caster sugar	1	—
Flour	1	—
Baking powder ..		¼

Method.—The method used was as for best quality, the water being whisked along with the eggs and sugar.

Yellow Cake (*High Ratio*):

	lb.	*oz.*
Special cake flour ..	1	4
Caster sugar	1	9
Milk powder		2
Baking powder ..		¾
Salt		¼
Special H.R. fat ..		10
Water		10
Whole eggs		15

Method.—Mix all ingredients except water and whole eggs for two minutes on slow speed (fine crumble). On slow speed add water and mix for two minutes. The eggs are added on slow speed half of the quantity over one minute scraped down, add remainder over one minute. Scrape down and mix further three minutes. Scale at 10 oz. into paper shapes in 1 lb. bread tins. Bake at 380°F. for 45 minutes.

White Cake (*High Ratio*):

	lb.	*oz.*
Special cake flour ..	1	4
Special H.R. fat ..		10
Caster sugar ..	1	8
Baking powder ..		30·1 gm.
Milk powder		2
Salt		¼
Cream powder ..		5·3 gm.
Water		13¾
Egg whites		12½

Method.—Mix flour and fats for five minutes on slow speed (fine crumble). Dissolve the remainder, except egg whites, in the water, add to the above, on second speed. Mix for five minutes. On slow speed add gradually half of the whites over one minute. Scrape down again and mix for a further two minutes. Scale at 10 oz. into paper shapes in 1 lb. loaf tins. Bake at 400°F. for approximately 35 minutes.

Assessment of Cakes

The baked cakes are judged visually and by taste, noting general appearance, shape, volume, the character of the surface and cell structure, colour and firmness of the crumb, texture, flavour, and eating qualities. It is appreciated that preferences even as to the appearance of cake may differ as well as opinions of eating quality. In these preliminary tests, fairly clear differences have been sought and there has been quite satisfactory agreement in judging cakes.

Experimental Work

Having made the various measurements on flour quality previously referred to, the next problem is to compare a series of flours with their behaviour in practical baking tests. This is necessary in order to decide which tests are the most valued in determining cake flour quality.

Some bakers are using speciality high chlorinated flours for most cake work; this is sold at a higher price than National flour. Others are using National, patents, or in Scotland, Winters flour. In some cases, especially for the export trade, confectioners are blending Canadian imported flour with biscuit flour. All of these standard types have been compared with several English milled high ratio cake flours and also with a special sample of a well known American cake flour. As well as these flours, wheat starch was also used. Best and medium quality Madeira and Sponge cakes were baked with illuminating results. The flours used were:

National ..	English High Ratio A
Patents ..	English High Ratio B
Winters ..	American High Ratio
Blend (50% Canadian, 50% biscuit flour) ..	Starch

Results

The results of tests on three English milled high ratio flours, one American, and one Canadian cake flour are given in Table 1, with results similar to those obtained with other flours commonly used for making the ordinary type of cake.

The special cake flours are characterised by low protein (some of the Canadian flours being as low as 6·5 per cent.), and by stiff inextensible dough as shown by both Chopin and Simon tests. The degree of both these features varies considerably. Maltose is generally low, but does not run in line with fineness of flour; if fine flour were achieved by heavy grinding then the maltose figures would be increased.

Granularity varies considerably even among the special flours, though all are finer than those intended for breadmaking and for general confectionery, such as the Scottish Winters.

Madeira Cake

All the cakes were of commercial quality. There was little difference between the first four flours, in either the best or the second quality cake.

The two English high ratio flours gave smaller cakes with a finer crumb of a brighter colour. The American flour and starch both gave cakes larger than the others with brighter crumb. Starch tended to give more peak to the cake; in other respects, it was remarkably good. On eating, however, it was rather dry, crumbling in the mouth. Two members of the tasting panel (confectioners) preferred this characteristic.

Table 1. Tests on High Ratio and Cake Flours

	National	*Patents*	*Scottish Winters*	*Blend (50% strong, 50% weak)*	*English cake flour* A	B	C	*American cake flour*	*Canadian cake flour*
	1	2	3	4	5	6	7	8	9
Moisture	14·4%	14·9%	14·0	14·4%	13·8%	14·2%	13·5%	12·3%	14·2%
Protein	11·14	10·53	8·71%	10·8%	8·70%	8·0%	7·1%	8·07%	9·5%
Maltose	2·24	2·04	1·96	2·16	2·08	2·1	2·5	0·94	—
Simon tests 1 hr.									
Water absorption (gallons per sack)	16·2	15·9	15·7	15·6	15·8	14·0	14·2	14·9	14·0
Resistance	50	43	35	33	92	92	102	69	60
Extensibility	20·4	21·5	20·2	23·5	9·6	9·3	7·0	12·0	14·0
Extensibility / Resistance × 10	4·0	5·0	5·7	7·1	1·0	1·0	0·7	1·7	2·3
Chopin tests—standard method									
Height in mm.	83	82	62	58	105	61	87	51	25
Length in mm.	82	87	59	99	27	33	25	51	52
Area in sq. cm.	38	39	19	29	20	13	15	18	8
Length / Height	1·0	1·1	0·9	1·7	0·2	0·5	0·3	1·0	2·1
Sieving 15 min.									
Tails 12	7·9	0·6	3·8	4·6	1·1	—	0·1	0·7	0·6
Tails 14	27·3	9·2	20·4	25·8	15·7	4·5	2·4	4·7	4·5
Tails 20	12·8	32·4	11·6	17·0	9·3	4·5	5·3	4·9	5·3
Tails 25	24·5	21·7	36·6	21·3	21·0	17·0	13·4	13·6	23·9
Thro's 25	27·9	35·8	27·0	30·9	53·0	74·0	77·9	75·8	65·5
	100·4	99·7	99·4	99·6	100·1	100·0	99·1	99·7	99·8
Amylograph 70/450									
Development time	42	42	42	41	41	32	—	—	33
Maximum viscosity	670	700	650	500	380	100	—	1,000	360
Viscosity at 45 min	500	590	410	240	210	100	—	—	140

Sponge Cakes

Two qualities were again made, and as in the case of the Madeira cakes, there was little to choose between the first four flours. The slightly brighter crumb given by the patents appeared to be hardly worth the extra price.

In the best quality sponge, the two English high ratio flours gave less volume with closer crumb. In the second quality sponge, these two flours showed more difference, one being smaller with a yellower crumb and the other equalling National in volume. The American flour gave very good sponges, larger than the others with finer crumb of clear bright colour. Starch equalled the American flour in volume in the best quality sponge and was even better in colour and fineness of crumb. In the second quality sponge, starch showed up even better than the others, giving the best volume and the finest and whitest crumb. There was one drawback—the sponge cake ate rather dry.

High Ratio Cakes

There is much work still to be done on high ratio recipes and the relation of fat to flour and to the quantity of liquor included in the mixing. This work is in progress, but so far it has not been decided whether a single formula can be used as a basic test for all the high ratio flours or whether each flour must be tested by several formulae to ensure proper evaluation.

On this type of flour some experiments were made in collaboration with a member firm to find:

(*a*) The effect of *creta* on chlorinated flour.
(*b*) The best amount of chlorination.
(*c*) The nature of the grist.
(*d*) The effect of the amount of grinding.

Briefly the results indicated that:

(*a*) Higher levels of chlorine than 5 to 6 oz. per sack (280 lb.) gave no additional improvement.
(*b*) The inclusion of *creta* at the present rate of 14 oz. per sack although raising the *p*H did not affect baking behaviour.
(*c*) There was little to choose between flour made from all Australian and from a blend of 75 per cent. English and 25 per cent. Australian.
(*d*) Regrinding flour from C roll did not give much measurable improvement.

These tests were only in the nature of preliminary guides and in the light of further information given, much more work on somewhat similar lines though with wider differences is needed. Further work is also in progress at the British Baking Industries Research Station on the effect and measurement of granularity and on the fineness of flour particle size achieved in various ways.

In our present state of knowledge, the characteristics of a good cake flour essential for high ratio cakes and probably desirable to a less extent for ordinary types of cakes are:

1. Low extraction flour milled from good quality but low protein wheats, *e.g.* sound English, Australian, American Soft Pacific.
2. Fine flour achieved not by heavy grinding but by repeated light grinding or some other means of reducing and separating particle size.
3. Treatment of the flour to bring the *p*H without *creta* to 5·0 to 5·4; about 5 to 6 oz. of chlorine per sack. The presence of *creta* raises the *p*H of the treated flour but does not appear to detract from the beneficial effect of chlorine treatment.

These considerations have led us to certain ideas on the production of good cake flour. Some of these are still unproven and colla-

(*Turn to p.* 488)

Frozen Concentrated Fruit Juices–2

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In the first part of this article, which appeared in the November issue, the concentration of orange juice was described. In this concluding part, the author discusses the restoration of volatile flavours, preservation, distribution and marketing, and quality standards. He concludes with a brief review of other frozen concentrates including lemon, pineapple, apple, grape, and tomato concentrates.

Restoration of Volatile Flavouring Ingredients

FRUIT juice concentrates prepared by low-temperature vacuum evaporation are largely free from cooked off-flavours, but the second flavour defect mentioned in the first article remains; they lack character because volatile flavouring ingredients are carried away with the water vapour during evaporation.

A number of procedures have been tried for the restoration to the concentrate of these lost ingredients.

In 1943-44, MacDowell and his associates of the Florida Citrus Commission found that the character could be restored to an orange juice concentrate by adding back some unconcentrated juice, amounting to approximately 10 per cent. of the volume of juice used to prepare the concentrate.[72, 73] This simple discovery was one of the basic factors which sparked the explosive expansion of the frozen orange concentrate industry.

The amount of volatile flavouring constituents in the fresh juice added is sufficient to impart natural orange flavour to the juice reconstituted from the concentrate. As Rector[9] points out, it is an advantage that only a fraction of the amount of volatiles removed is restored, since flavour deterioration in orange juice in storage appears to be associated with the volatile constituents and even in freezing storage some flavour deterioration occurs.

Present practice in the industry is therefore to concentrate to a solids content of 55° to 60°B. and to add back fresh juice (about 50 per cent. of the volume of concentrate) so as to give a final solids content of 42°B. The fresh juice added is termed "cutback" juice, and it is customarily more pulpy ($\frac{1}{8}$ in. screen) than the juice fed to the evaporators (0·027 in. screen). Kaufman and Campbell[10] confirmed the value of adding back fresh juice in improving the quality of concentrates throughout their storage life, and they also observed favourable effects of carrying out the operation of blending concentrate and fresh juice at low temperatures.

The adding-back operation is carried out with the aid of a "blender" which automatically proportions the components and controls the final density, and the mixing is completed in cold-wall tanks equipped with agitator-scrapers.[51, 57]

A Buflovak low temperature double effect evaporator showing the vapour separators. Conveniently located observation glasses give a clear view of operations.

Addition of Volatile Oil

Rice, Keller, and Beavens[15] found that flavour restoration by the addition of cutback juice to orange concentrates was effective mainly because of the volatile oil content of the fresh juice. The major portion of the volatile oil in the juice comes from the peel. These workers therefore tried adding to orange concentrates good quality cold-pressed orange oil to a level of 0·01 per cent., which was found to be optimum. The concentrates were satisfactory in initial flavour and stable at 0°F. for at least eight months. A purée prepared from whole oranges was also an acceptable source of oil for this purpose. Kaufman and Campbell,[10] however, found that concentrates containing added orange oil were inferior to those containing cutback juice.

Flavour restoration with orange oil which causes no dilution opens up the possibility of evaporating orange juices only to the fourfold level (42°B.), or of marketing sixfold concentrates (58°B.) which have advantages in easier reconstitution and greater cloud stability.[74]

Recovery of Volatile Flavourings

The most obvious procedure of flavour restoration is, no doubt, to recover the volatile flavouring materials from the condensate and add them back to the concentrate. Such a procedure is practicable only because of the fact that the flavouring materials come over almost entirely with the early fractions of distillate.

The Kestner Evaporator Co. pioneered the recovery of the volatile flavours in fruit juice concentration by equipping their evaporators with an "ester recovery" stage.[5, 23, 75] The juice is preheated in a coiled-tube preheater and flashed under vacuum into a vapour separator. The vapours are condensed in a water- or brine-cooled surface condenser and withdrawn through a barometric discharge. In this way, an aqueous fraction is obtained amounting to about 10 per cent. of the original juice and containing virtually all the volatile flavouring constituents; but addition of this fraction to concentrated juice results in considerable dilution.

The "Essence" Fraction

The United States Department of Agriculture has carried this procedure a stage further. The vapours removed by a preliminary heat treatment of the juice are put through a fractionating column so as to concentrate the flavouring materials into an "essence" fraction of small volume which when added to a concentrate causes very little dilution. White[76] has determined the composition of this essence fraction.

For the initial "stripping" operation, in this case at atmospheric pressure, Eskew and co-workers[77-80] use a high velocity tubular preheater and a tubular vaporiser, both steam-jacketed. The juice is heated to 210°F. in one second (total heating 2·4 seconds) and flashes into a vapour separator where 10 per cent. is removed as vapour.

Alternatively, Brown *et al.*[81] recommend a direct steam injection heater in conjunction with a short tubular evaporator, in which 18 to 20 per cent. of the juice is vaporised in a few seconds. Direct steam heating requires a source of pure steam and increases steam consumption but it avoids fouling of heat exchangers. By means of this unit, apple and grape juices and purées of apples, apricots, peaches, pears, and berries have been stripped, with no cooked flavours in either the essences or the stripped residues.

Dimick and Makower[82] describe a laboratory scale continuous vacuum flash evaporator which was used to strip volatile flavours from strawberry purée.

Walker, Nimmo, and Paterson,[13] found that sixfold apple juice concentrates cut back to fourfold with fresh juice were deficient in natural flavour. But the addition of concentrated essence to these concentrates, or to fourfold concentrates containing no cutback juice, completely restored natural flavour.

In the preparation of frozen pineapple juice concentrates, a concentrate of 60°B. is cut back with single-strength juice and a concentrated essence.

With orange juice, however, addition of condensate fractions, straight or redistilled, is not a satisfactory method of flavour restoration. Several workers[2, 10, 13] have found that concentrates so prepared develop foreign flavours described as "apricot" or "strawberry" even in storage at 0°F. Morgan *et al.*[83] did not encounter off-flavours but observed a loss of aromatic potency in storage.

Kirschner and co-workers[84] have recently determined the detailed composition of the volatile flavouring constituents of grapefruit juice and will shortly publish similar information on orange juice.

Packaging Methods

Frozen concentrated fruit juices are packaged mainly in cans. In fact, this industry pioneered the use of cans for frozen foods.[85]

The popular can size is the 202 × 314 can containing 6 fl. oz. of concentrate which reconstitutes with three volumes of water to make 1½ pints (U.S.) of juice. Other sizes in use are 4 oz., 12 oz., and 32 oz. The cans are made from 0·25 lb./b.b. electrolytic tinplate, internally lacquered, and labelled in full-colour lithography.

The concentrate, usually slush-frozen, is filled in plunger-type fillers and the cans are closed on high-speed lines running up to 400 cans/min.

Kaufman and Campbell[10] and Cotton *et al.*[86] claim advantages in flavour retention from vacuum or inert gas packing, but these procedures have not been considered necessary in commercial practice.

Frozen concentrates are also being packed in glass tumblers[87] and in some other novel containers, *e.g.* aluminium collapsible tubes and polyethylene bags containing a single serving; 1½ oz. reconstituting to 6 oz., or 2½ oz. giving 10 oz.[88-94]

Preservation

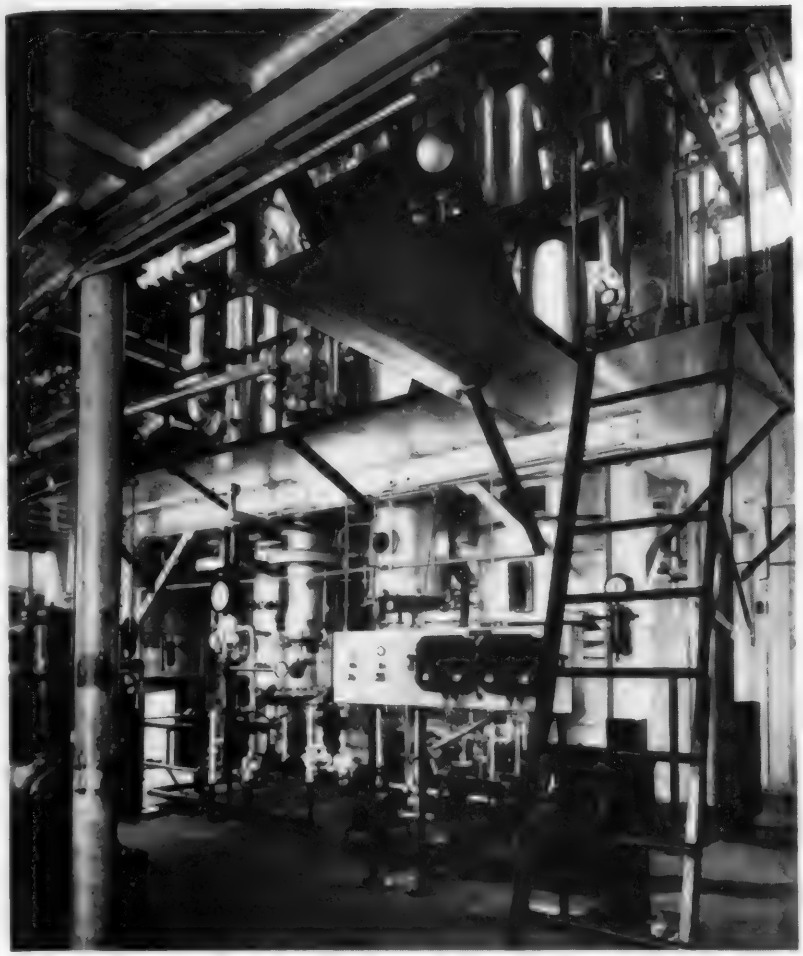
Several alternative procedures were possible for the preservation of fourfold orange juice concentrate, *e.g.* freezing, heat processing, and chemical preservatives. Freezing preservation had the all-important advantage of conferring, in addition to microbial stability, the flavour stability that was notably lacking in heat-processed orange juices held at atmospheric temperatures.

Present general practice[15, 59] is to freeze the product in a continuous unit, *e.g.* Votator, to a semi-solid consistency at 16° to 18°F. before filling into cans. To reduce the temperature of the canned product to the desirable level of 0°F. or lower, a number of procedures are in use, *e.g.* direct contact with refrigeration coils,[36] air-blast freezing tunnels,[95] continuous immersion freezers,[51, 96] and walking-beam freezers with sprayed refrigerant.[51, 58]

Kaufman and Campbell[10] examined a number of different freezing techniques, but found no effect of rate of freezing on the quality of the product. However, Heid[97] states that the speed of freezing affects the texture and flavour of the reconstituted juice. Morgan[98] has made some studies of the thermal properties of orange concentrate at low temperatures.

Aseptic Canning

Not all frozen orange concentrate is frozen. The Martin aseptic canning process[99] is being applied to produce a pack which is stable to microbial spoilage at atmospheric temperatures. The fourfold concentrate is pasteurised at 200°F. for 48 seconds, immediately cooled and filled aseptically into 6 oz. cans. This concentrate is claimed to be more stable in flavour than canned single-strength juices, but it is stored and marketed at 40°F. to minimise flavour deterioration.[100, 101]



Bulovak evaporating units designed for the production of true flavour fruit concentrates.

Storage

The quality of frozen orange juice concentrate depends greatly on conditions, notably the temperature, during storage and handling. The industry generally recommends that it should be held at a uniform temperature not higher than 0°F.[97] At this temperature the product shows satisfactory stability of flavour and cloud and no loss of ascorbic acid for at least one year.[86, 102-104]

Short periods of exposure to temperatures above 0°F. tend to shorten storage life even when the temperature is returned to 0°F. or lower.[103, 104]

Transport

To move frozen concentrates from production areas to markets requires refrigerated transport[105] —by rail, road, or sea. But because of the reduced bulk of the concentrates, transport costs are apparently much the same as those for the equivalent quantity of single-strength juice, shipped without refrigeration.

Retail Distribution

In retail distribution, frozen concentrated orange juice appears as one of the many frozen foods available to the American housewife. In fact, it is the frozen food selling in greatest amount, accounting for one-third of all frozen food sales. In addition to distribution through frozen food cabinets in grocery stores and super-markets, it is widely merchandised in drug stores and eating places in individual servings —from jugs, mechanical dispensers,[106] or polyethylene bags.

Consumer reactions have been very favourable, particularly because other forms of processed orange juice are not completely acceptable. Canned pasteurised orange juice quickly develops off-flavours at atmospheric temperatures, and frozen single-strength orange juice is inconvenient to use because it thaws too slowly. But when the frozen concentrate is mixed with three volumes of water it thaws almost immediately and gives a pleasantly chilled drink which at its best is very close to fresh orange juice in aroma, flavour, and nutritive value.[107]

Zinn and Bien[108] in a two-year survey found that frozen orange concentrates purchased in New York were comparable in vitamin C content with fresh orange juices, but the fresh juices were consistently preferred for flavour. However, the cost of the concentrates was only about half that of juice from Florida fruit and about one-third that of juice from California fruit.

In the domestic refrigerator, orange concentrate can be held for four days at 41°F., or eight days at 33°F., without loss of flavour or ascorbic acid.[109]

Sokoloff and Redd[110] studied the vitamin P content of frozen orange juice concentrates.

Quality Standards

Standards of quality for frozen concentrated orange juice, grapefruit juice, and grapefruit-orange blend have been laid down by the United States Department of Agriculture.[18, 111] In addition to descriptive requirements for colour, flavour, and absence of defects, they specify quantitatively the Brix range, the range of Brix to acid ratios, and the recoverable oil content. Members of the industry have also proposed minimum standards.[31] Quality standards and test methods laid down by the Minute Maid Corp. are described by Brokaw.[112]

In the absence of official standards, the California Lemon Products Advisory Board has approved standards for frozen lemonade products.[13]

Microbiological Considerations

The heat treatment received by orange juice during low-temperature concentration is not sufficient to destroy contaminating micro-organisms. The surviving organisms do not normally affect the quality of the product,[19] but the nature of the microbial population

has public health significance, and the presence of faecal organisms has been regarded as evidence of low standards of hygiene in the plant. The position is complicated, however, by the fact that some non-faecal organisms occurring on citrus fruits give diagnostic tests very similar to those for coliform organisms. This difficulty has stimulated investigations on the microbiology of citrus concentrates.[113-123] Another microbiological problem, already mentioned, is off-flavour spoilage due to lactic acid bacteria.[62, 124-127]

Clarification, Gelation, and Sugar Hydrates

The major quality defects that have been observed in frozen concentrated orange juice are clarification and gelation. Normally the frozen juice should show good stability of the "cloud" which is held in suspension by pectin, but the low-temperature processing of the concentrate permits the survival of pectinesterose enzyme. This enzyme degrades the pectin so that it no longer suspends the cloud effectively and the juice clarifies to a straw-coloured serum above a yellow sludge. At the same time the low-methoxyl-pectins formed may react with calcium ions to form gels.

These reactions have been extensively studied,[15, 112, 123-139] and the following points emerge:

(i) Clarification and gelation do not occur if the storage temperature is at all times 0°F. or below.
(ii) Juices of high pulp content and juices from seedy varieties are particularly subject to clarification and gelation.
(iii) Pasteurisation of juices prior to concentration may be necessary to inactivate pectolysing enzymes.[101, 123, 129, 138, 139] The majority of processors have now made provision for some heat treatment of juices prior to concentration.[56]

Some investigators consider that any pasteurising treatment is detrimental to quality,[10, 140] but Keller *et al.*[136] found that direct steam injection could be used to obtain increased cloud stability without flavour damage; see also Madsen.[141]

Another quality defect recently encountered is the appearance of crystalline sugar hydrates in frozen grapefruit concentrates and limeades.[142]

OTHER FROZEN CONCENTRATES

As mentioned earlier, orange juice concentrate is the main product of the frozen concentrate industry, and this product has dominated the discussion so far. But there is in addition a considerable variety of other products which are reported[143, 144] to be in commercial or pilot scale production, thus: lemon, lemonade, limeade, grapefruit, grapefruit-orange, orange-apricot, tangerine, pineapple, passionfruit-pineapple,[145] pawpaw, apple, grape, tomato, prune, cranberry, milk, chocolate-milk. Only a few of these products can be regarded as established packs.

Frozen Concentrated Lemon Products

Several companies in California are preparing concentrated lemon juice products. The Exchange Lemon Products Co. at Corona uses a Mojonnier unit to prepare concentrated lemon juice and also lemonade concentrate, which consists of single-strength juice with about 10 per cent. concentrate and added sugar. Both concentrates are put out as pasteurised, canned products as well as frozen products.[146, 147] Some lemonade concentrate is supplied to dairies where it is reconstituted and distributed with the milk.[148] A pack of bottled preserved lemon juice is also prepared by reconstituting concentrate; this method of preparation enables the composition of the product to be closely standardised.[149]

Ventura Coastal Lemon Co. prepares concentrated lemonade base with a Carrier-Howard single-stage unit.[56]

Golden Citrus Juices Inc. also uses a Carrier-Howard unit to prepare frozen lemon concentrate which is packaged in collapsible aluminium tubes. The contents of one tube (2 fl. oz.) when reconstituted 1 : 6 give the equivalent of the juice of one dozen lemons. The product is claimed to be stable against microbial spoilage at room temperature but not against flavour deterioration.[150-153]

Frozen Pineapple Concentrate

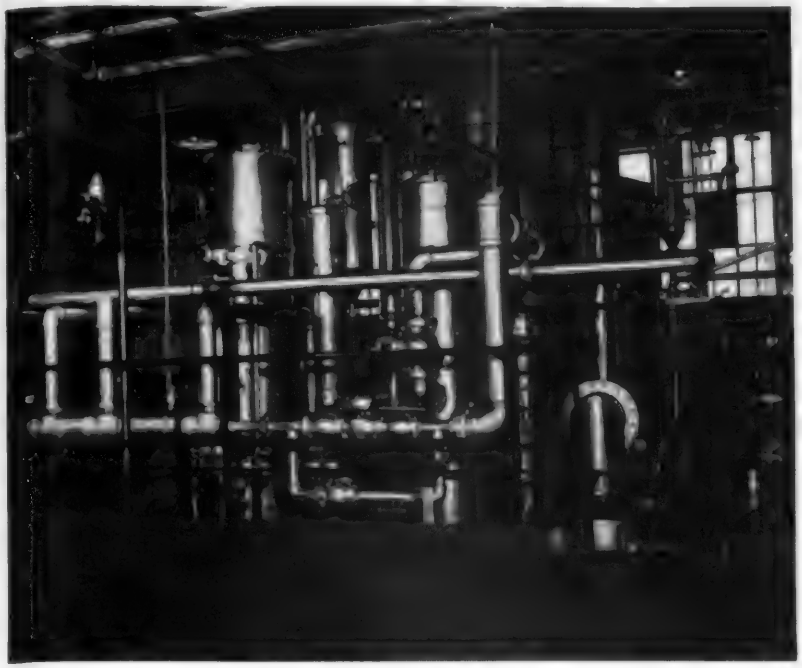
Hawaiian Pineapple Co., Honolulu, is producing frozen concentrated pineapple juice to which both cutback juice and recovered volatiles are added.[57, 93, 154] Seale[155] states that volatiles from the flavour-rich summer pineapples are stored and added to concentrates prepared from winter fruit.

Pineapple juice, after the normal extraction procedures, is given a mild pasteurisation to inactivate the bromelin enzyme and is fed at 130°F. to a Carrier-Howard triple-effect evaporator, where it is partially concentrated and the second- and third-effect condensates are passed through a 44-foot fractionating column and refrigerated condenser to recover an essence fraction containing volatile flavouring materials. Subsequently the juice is again fed to the evaporator at one-third the flow rate and concentrated to 66° Brix. Single-strength juice and essence fraction are added back to give a concentrate of 47° Brix. This product is filled into 6 oz. cans and frozen. A continuous freezer with a 10-foot wide wire-mesh belt, through which blows an upward airblast at −35°F., freezes 250 cans per minute, dropping the temperature of the concentrate from 50°F. to −10°F.

Frozen Apple Juice Concentrate

The pioneering work on frozen apple juice concentrate has been carried out mainly at the Western Regional Research Laboratory of the United States Department of Agriculture.[13, 156] There the favoured product is a fourfold concentrate to which volatile flavouring materials are restored in the form of a concentrated essence. This product is preferred to sixfold concentrates cut back with fresh juice because (*a*) all the product is sterilised in the essence stripping operation, and (*b*) evaporation costs are lower.

The procedure recommended for the preparation of apple juice concentrate is as follows: After extraction, the juice is "stripped" by direct steam injection and passage through a short tubular evaporator as described above. The vapours are fractionated and a concentrated essence recovered which amounts to about 1 per cent. of the volume of the original juice. The residual juice is depectinised or not according to whether a brilliantly clear or



Buflovak recovery unit in which aromatic essence is concentrated 150-fold.

slightly cloudy product is desired. However, pectin increases the viscosity of the concentrate so that it is not practicable to concentrate beyond 55°B.[156] Then the juice is concentrated fourfold, but a "low-temperature" evaporator is not necessary for this operation. A forced-circulation evaporator with juice temperatures not exceeding 135°F. is recommended, but satisfactory results were obtained in an agitated vacuum pan with jacket temperature 190°F. and vacuum 28·5 in. Hg. The fourfold concentrate is blended with essence in agitated, cold-wall tanks, filled into lacquered 6 fl. oz. cans, sealed, and frozen. The product is stable in flavour for at least 12 months at 0°F.[157]

The fourfold concentrate was also pasteurised at 200°F. in a high-velocity tubular pasteuriser, hot filled, sealed, inverted three minutes, and cooled. The pasteurised product was indistinguishable from the frozen product 48 hours after preparation, but in room temperature (75°F.) storage it showed appreciable off-flavour at three months and progressive flavour deterioration thereafter.[157]

Kaufman, Nimmo, and Walker[158] provide an estimate of costs for commercial manufacture of frozen apple juice concentrate, and they state that the minimum plant capacity for economical operation is probably about three tons of apples per hour = 500 gallons of juice per hour = 2,500 cans (6 fl. oz.) of frozen concentrate per hour.

Eskew *et al.*[159] recommend concentrating apple juice sevenfold to 68·5°B. with added essence. This product is not frozen but stored at 35°F. where it is stable for at least one year. When reconstituted with six volumes of water to one of concentrate, it gives a beverage comparable to high-grade single-strength processed apple juice, whereas the fourfold frozen concentrate reconstitutes to a beverage closer to fresh apple juice.

Frozen fourfold apple juice concentrate is now in commercial production in the Pacific Northwest following a well-organised programme of consumer acceptance and marketing tests which indicated that the product was well received.[160-162]

There is also a small production of apple concentrates by freezing concentration.

Frozen Grape Concentrate

Minute Maid Corp. has a plant at Dundee, New York, for the preparation of frozen concentrated Concord grape juice.[14, 163] A Carrier single-effect recirculating evaporator is used with a juice temperature of 100°F. and a vacuum of 28½ in. Hg. Detartrated grape juice is concentrated to 50° Brix, then cutback juice and sugar are added to give a final product of 47° Brix which is canned and frozen.

Eskew *et al.*[79] describe procedures for preparing grape juice concentrates with simultaneous stripping of volatile flavouring materials which are added back to the concentrate as a redistilled essence. Analogous procedures may be used to prepare high-density grape juice concentrates (72·8°B.) containing essence and added sugar, which are stable at 35°F.[80]

Frozen Tomato Concentrate

Keller, Rice, and McColloch[164] attempted to concentrate tomato juice in a single-stage recirculating evaporator with a juice temperature of 60°F., but were unable to go above 15 per cent. total solids because the thick consistency prevented filming. But by removing some of the pulp on a 60-mesh screen they prepared concentrates of 25 per cent. total solids, and by removing more pulp, concentrates of around 40 per cent. solids, to which pulp was added back to give final products of 22 to 28 per cent. solids, requiring three to four parts of water for reconstitution. The concentrates, canned and preserved by freezing or by heat processing, compared favourably with fresh juice in initial quality and in flavour stability.

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Food and Agriculture Statistics

A RECENT volume* in the series of O.E.E.C. Statistical Bulletins presents the basic data on many aspects of food and agricultural products. The tables given cover the O.E.E.C. member countries and the United States and Canada, countries associated with the work of the Organisation. Some tables include historical series for world production and for major producing countries.

Divided into five parts, the bulletin deals with production (historical series of world production for selected commodities from 1900 to 1953), foreign trade, availability and utilisation, consumption, and country tables showing trends in production, availability, and food consumption.

* *Basic Statistics of Food and Agriculture.* Pp. 119+vi. O.E.E.C. Price 10s.

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Cake Flours

(*Concluded from p. 482*)

boration is invited from those who have milling or commercial baking facilities to try out these ideas. What is required is fine flour with the starch grains well separated and free from enclosing endosperm walls and gluten, but the starch should not be damaged.

The production of a first class cake flour might be achieved by dressing the flour produced at the head of the mill through a very fine silk, say 20xx or even 25xx, instead of grinding the flour down in size, and taking only that flour for cake flour. It may be that the choice of the grist is of importance mainly owing to the ease with which the wheats will break down under light milling to give a worthwhile quantity dressed through such a fine silk. This method of production might well account for the protein levels of about 6·5 per cent. in some Canadian flour. If flour of this type should prove successful, it may be necessary to review our ideas on the optimum quality of chlorine treatment. It is also necessary to decide whether such a method is commercially and economically practicable.

Finally it is desirable to have a series of "tailor-made" flours to give first class results with special recipes or it may be wiser to compromise on flour quality of sufficient tolerance to give reasonably good quality on most recipes though not excelling in any.

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Vitamin Encyclopædia

WHEN completed, this monumental work* will comprise three volumes in which the editors aim to "summarise critically and present adequately the current knowledge concerning the chemistry, industrial production, physiology, biochemistry, estimation, occurrence, deficiency effects, pharmacology and requirements of each vitamin," with special emphasis on the chemistry and physiology. The vitamins are arranged in alphabetical order and the volume now under review covers vitamin A and carotene, ascorbic acid, vitamin B_{12}, and biotin.

To those concerned with the more practical side of nutrition the first and second chapters will probably be of the greatest interest, although vitamin B_{12} is now known to be of considerable importance in human nutrition and many will wish to read this chapter in order to discover what is known about this most recently discovered of the vitamins. Biotin is probably one of the less important vitamins to most potential readers, for so far it has not been demonstrated to be of significance in human nutrition except in the one now classical case of the eccentric gentleman who subsisted for many years on a diet of wine and raw eggs!

Chemists associated with the food industry may well turn first to the chapter on vitamin A, with its very full account of the work recently carried out on the structure and synthesis of the vitamin; they will be especially interested in the account of the way in which the chemical constitutions of the various stereo-isomers were determined. Their biological colleagues will doubtless turn to the section in which the role of vitamin A is discussed by Dr. Wald (who has himself done so much to unravel this complicated story), a section which is surely one of the most fascinating in this volume. It is now known that the β-carotene ingested in the food first combines with a protein and is then oxidised by means of an enzyme to retinene, which is then reduced to vitamin A by means of alcoholic dehydrogenase, thus involving another vitamin, nicotinamide, as coenzyme. A similar transformation takes place in the eye when rhodopsin under the influence of light is converted into retinene which is then reduced as above to vitamin A. Rhodopsin is regenerated by the reverse reaction. This series of changes has been known in broad outline for many years, but it has recently been found that only one isomer of vitamin A, the so-called neo-vitamin *b*, can form rhodopsin by combination with the appropriate protein; the other stereo-isomers of vitamin A have first to be converted into neo-vitamin *b* before becoming biologically active.

The chapter on vitamin C is a most welcome review of a subject which has been neglected of recent years, and it is useful to have the main outline once more presented for the benefit of the non-specialist. Bearing in mind that the structure of ascorbic acid was elucidated in 1933, it is astonishing to find that even now so very little is known about the rôle of ascorbic acid in the body. Is there, as some believe, an enzyme that catalyses the reduction of dehydro-ascorbic acid to glutathione, and if so, does this form a hydrogen transfer system similar to that of cytochrome, or is the rôle of ascorbic acid in the living cell simply that of a protective agent for other cell constituents by a non-enzymic reaction? These and cognate questions are critically discussed by Dr. Mapson and will be found particularly helpful by those who have not kept up with the more recent work on vitamin C. Those responsible for controlling the vitamin C content of foodstuffs will be grateful to Miss Olliver for her excellent review of the methods used for the assay of this vitamin with the emphasis placed on the importance of sampling and the care that must be taken in preparing a sample for analysis.

Although the editors state that methods of vitamin assay have been "discussed but briefly," the excellent review on vitamin B_{12} assays by Drs. Jukes and Williams, pioneers in this field, will assist in clarifying for many the particularly confusing picture which the problem of vitamin B_{12} assays presents at the present time.

Each of the four chapters includes tables showing the amounts of vitamins (or pro-vitamins) in the most important foodstuffs with a brief summary of the effects of canning and preserving on the vitamin contents of certain of these. The review relating to vitamin C is especially useful where this problem is, of course, of paramount importance. Considering the list of values given for the vitamin B_{12} content of foodstuffs, however, one cannot help wondering how many of them are reliable, bearing in mind the wide variety of assay methods that have been used and the presence in foodstuffs of several other substances besides vitamin B_{12} that stimulate the growth of the test-organisms used.

There is also a useful discussion on the requirements of each vitamin by different species of animals and by man. It is interesting to note once again the difference in the figures for vitamins A and C requirements selected as optimal by workers in the U.S.A. on the one hand, and in the U.K. on the other, but one is pleased to note that the values arrived at in this country during the war as a result of experience with British rations are fairly reported and that the conclusions drawn from the Sheffield experiment in which a group of conscientious objectors subsisted on a diet very low in vitamin A to determine the long-term results of vitamin A deficiency are also given due weight.

Each chapter includes an adequate but deliberately restricted survey of the clinical and pathological results of vitamin deficiency and in the case of vitamin A the effects of overdosage. Most workers in the field of nutrition will applaud the criticisms levelled at the questionable purposes for which vitamin C is sometimes advocated. Nor can one refrain from referring to Dr. Vilter's story of "Joe S." with which he intro-

* *The Vitamins: Chemistry, Physiology, Pathology.* Vol. 1. Edited by W. H. Sebrell, Jnr., and R. S. Harris. Pp. xiv+676. New York: Academic Press. London: Academic Books. 1954. Price $16.50 (£6 12s.).

duces his section on the effects of vitamin C deficiency in human beings. This is a delightful piece of dramatic prose and it is a pity that more scientists cannot adopt this style of writing, though admittedly few scientific experiments lend themselves to this particular type of treatment. A description of the industrial production of all four vitamins is included, but these are necessarily rather sketchy although references to the patent literature go some way towards remedying this deficiency. The problem of stabilising some of these labile vitamins is also referred to, again rather too briefly perhaps. In general, however, the copious literature references given throughout the book should enable anyone with a special interest to obtain more detailed information on any point.

There is an excellent author index and subject index and the book is singularly free from misprints. It is well printed and well bound, but unfortunately the price is high and may well place it beyond the reach of many individuals who might otherwise wish to have it on their bookshelves.

F. A. ROBINSON.

Canned Meats Symposium

THE papers presented at a symposium arranged to present information of value in improving the quality of canned meats for the U.S. Armed Forces have now been published in booklet form by the Quartermaster Food and Container Institute for the Armed Forces.

The scope of this symposium included the presentation and discussion of scientific and technical data concerning the quality, stability, and acceptability of canned meat products and some important considerations of the future development of these products.

The papers cover the technical aspects of canning as well as practical discussions on present and new methods of manufacturing. These included the processing of canned meats utilising standard and improved methods of heat treatment as well as cold sterilisation techniques which are now receiving a great deal of attention.

Cake Staling Tests

MOST investigations concerned with increasing the shelf life of bakery products during the past century have been concerned with bread, as a result of which very little has been reported on the problem of cake staling.

In a recent bulletin issued by the American Society of Bakery Engineers, W. G. Bechtel and D. F. Meisner give details of technical studies of the causes of cake staling. There is no known physical or chemical test by which the freshness of cake can be reliably measured; it can be measured only in terms of consumer judgment of the product by means of a taste test panel.

For the taste test studies described, pound cakes were baked in tinned cans which were sealed within a few minutes after leaving the oven; in this way, the cakes were under partial vacuum so that there was a minimum of air in the can. Cans were used as they offered the most convenient laboratory method of storage in a completely sealed, moisture- and airproof wrapping and provided a standard for comparison with other packaging materials. The cakes were stored at room temperature, between 75° and 80°. To ensure against development of food poisoning organisms, the formula was altered to give cakes with a low moisture content, approximately 18 per cent.

An initial test was given to find the panel judgment of the canned cake when fresh, 24 hours after baking. The extent of staling which occurred on storage in the cans after this first test was determined by the decrease in freshness found by the panel. Because the cake was somewhat dry, the initial taste test gave a low value for the "Percent Freshness," which was 57 per cent. Actually it made no difference whether this first test was low or high, the important factor being the amount of *change* in freshness which was found after various periods of storage.

Tests were made at the end of several storage periods until the cake was somewhat more than a year old (60 weeks). Results of the tests are given in Table I. At the end of one and two weeks it was judged 52 per cent. fresh, while after eight weeks it was judged 56 per cent. fresh. These variations from the original value of 57 per cent. fresh are small enough to indicate that no measurable staling had occurred. Even after 60 weeks the "Percent Freshness" was 46 per cent., a value which showed that only a small amount of staling had occurred. Most of this can be attributed to the development of a definite off-flavour, which was decidedly rancid, and was probably caused because some of the cans were not sealed as rapidly as the others, so that they contained more air which accelerated the development of rancidity.

Some cakes were wrapped in *Cellophane* and others were left unwrapped in a metal cake box for one week. At the end of this time cake wrapped in a double layer of *Cellophane* and carefully heat sealed was 50 per cent. fresh, while cake wrapped in a single layer of heat-sealed *Cellophane* had dropped to 45 per cent. fresh, about the same as the rating given to year-old canned cake. The unwrapped cake was found to be very stale, its "Percent Freshness" being only 18 per cent. At the same time it had lost 24 per cent. of its original moisture.

Physical, chemical, and micro-

TABLE I

EFFECT OF STORAGE CONDITIONS ON FRESHNESS OF POUND CAKE

	Freshness Per Cent.*			
Storage period weeks	*In sealed tinned cans*	*In double layer moisture-resistant Cellophane*	*In single layer moisture-resistant Cellophane*	*Unwrapped in metal cake box*
0	57	57	57	57
1	52	50	45	18
2	52			
5	49			
8	56			
60	46			

* The percentage of the panel members who judged the cake to be fresh.

biological changes can all be minimised by freezing the product. At the low temperature of the freezer (0°F.), moisture change becomes negligible because of the low vapour pressure of water. The other physical and chemical changes are also greatly retarded at low temperature. While it is practical under certain conditions to freeze cakes for short periods of time, it would be uneconomical to use this means of prolonging shelf life for long periods.

The experiments with pound cake show that it is possible to extend the shelf life of cakes for long periods at normal room temperature. This was accomplished by packaging the cake in a container which prevented loss of moisture and other volatile substances, and prevented access of air to the product. This suggests that the baker should use packaging materials which are as nearly moisture- and air-proof as possible, and that the greatest care should be taken that such packages are perfectly sealed.

It is possible for most bakers to make tests of the shelf life of their products, using taste testing methods. Such methods need not be elaborate or difficult. In this way the effect of variations in formulation, processing procedures, and packaging materials and methods on the keeping quality of his products can be studied. Such studies should give information that would help minimise stale losses.

Soft Cheese Making

IN his review of the activities of the Society of Dairy Technology, presented at the annual general meeting, Prof. E. L. Crossley, President, reported that the membership had now reached the satisfactory total of 1,686, a gain of 61 members over the previous year. A further expansion of the Society's activities had taken place by the formation of two new Branches, one in London and the other in Brighton, both of which would be organising their own meetings to cater for the needs of local members.

At the meeting, Prof. G. Mocquot of the Central Milk and Microbiology Research Station, National Institute for Agricultural Research, Jouy-en-Josas, France, gave a paper on "Soft Cheese Making."

Speaking of the main characteristics of soft cheese, Prof. Mocquot said that their thickness is always moderate as the ripening proceeds from the surface. The rind formation and thickness are very important points as a rind which is too thick means an appreciable loss in the cheese weight and in the edible portion of the cheese. The taste depends:

1. On the nature of the surface flora. The cheeses with moulds on their surface (*Penicillium candidum*) usually have a milder taste than those with a washed rind on which grows a slime of proteolytic bacteria.

2. On the bacteriological quality of the milk at the time of renneting. A slightly acid milk will give cheeses with a mild taste, a milk which is more acid giving cheeses with a stronger taste.

The milk can exert an influence either by its chemical composition (proportion of saturated and unsaturated fatty acids in the milk fat, firmness, and consistency of the curd after rennet action) or by its bacteriological quality (the best results are obtained when milk is renneted at the farm; transport of raw milk in churns over long distances is usually detrimental to the bacteriological quality). The presence of coliform organisms in the milk, causing blowing of the curd in the hoops, is to be avoided.

Pasteurisation of the milk gives a more uniform bacteriological quality, but it is difficult to obtain the quality of the best products made with raw milk.

The milk should be inoculated with a good lactic acid starter so as to obtain the right draining in a given length of time from day to day. Almost all soft cheeses are renneted when the lactic starter is already actively growing in the milk; this makes a difference with the big hard pressed cheeses of the mountainous parts of France which are made with non-acid milk.

In cases where the surface of the cheeses is covered with a mould, *i.e. Penicillium candidum*, this mould is usually inoculated on the cheese surface after the removal of the hoops, when draining is finished.

The curdling lasts from one to one and a half hours on the average. The draining is obtained mainly under the influence of acid formation in the curd. Mechanical effects (pressure, cutting) are of little importance.

Salting takes place when draining is finished and when the cheeses are placed in a room at a lower temperature, either by rubbing the salt on the surface of the cheeses or by immersing in brine.

Ripening takes place in a room in which there is a high humidity level but with enough ventilation and a temperature in the neighbourhood of 14°C. On the surface there is first a growth of yeasts (*Torula*) and *Geotrichum candidum*. Then the white moulds appear (*Penicillium candidum*) or the proteolytic bacteria slime, depending whether the cheese is washed regularly (bacteria) or not (moulds).

The cheeses are finally wrapped in paper and placed in wooden or cardboard boxes in which the last part of the curing takes place, preferably at a rather low temperature (12°C.).

The manufacturing room has a heating device which allows the temperature to be quickly raised (25°C.) or lowered (15°C.) as the making process demands. The salting and ripening rooms are regulated at a lower temperature (12° to 15°C.) and the ripening room also has a regulation for humidity. The final curing room is at 10° to 12°C. All these rooms should be easily cleaned.

The vats for milk and curd are of metal. The usual size is 100 litres, but large vats (2,000-4,000 litres) in which the cutting of the curd takes place have been tried during the past few years. The draining tables were formerly made of wood but are now of aluminium or stainless steel. The hoops are of aluminium, tin, stainless steel, or plastic. The shelves on which the cheeses are placed are now made as portable units for some 20 cheeses and can be piled one above the other.

Abstracts From Recent Food Literature

Soviet Research on High-frequency Sterilisation of Preserves (*La Revue de la Conserve de France et de l'Union Française*, 1954, **9**, August/September, 112).—The Soviet Institute for Food Preservation, Moscow, has developed a method whereby preserves in jars of normal size are subjected to high-frequency treatment for 60 to 80 seconds. It is claimed that this method permits the preservation of fruit of advanced ripeness, rich in vitamins, aroma, etc. After two years fruits thus preserved are said to be indistinguishable from fresh ones.

Soft Drinks in Sweden. R. Steenhoff (*Livsmedelsteknik*, 1954, **2** August, 11).—Swedish soft drink consumption now amounts to 200 million litres per annum, production being shared by about 400 undertakings. The technology of the manufacturing process has been considerably improved in recent years, and important research work has been carried out. It was, for instance, found that the internal surface of the bottle had a greater influence on the retention of carbon dioxide in the liquid than had previously been assumed. Much progress has been made in mechanising the manufacture (*e.g.* more efficient bottle rinsing and filling machines, use of fork trucks and pallets for transport) and in utilising waste; one Stockholm factory is using waste gases for the production of all its carbon dioxide requirements.

Mouldiness of Cocoa Beans. W. H. E. Schreuder (*Gordian*, 1954, **54**, No. 1291, 11).—Recent cocoa crops from the Ivory Coast, though showing a considerable increase in quantity, have suffered a certain deterioration in quality owing to the appearance of mouldiness on the cocoa beans. Following up the research work of R. Renaud, a French research worker at the *Centre de Recherches Agronomiques* at Bingerville, the present author, who is working at the Netherlands Royal Tropical Institute, has found that the risk of mouldiness affecting the cocoa beans can be averted by careful fermentation and subsequent quick drying. Even before the crop is harvested, a beginning can be made by removing the overripe and damaged pods. Producer, importer, and manufacturer must co-operate to ensure dry storage throughout. In many cases, mould appears invisibly below the shell and can be detected only by its musty odour.

Ultrasonic Conching (*Revue Technique de l'Industrie Alimentaire*, 1954, **2**, August, 18).—A prototype ultrasonic conching machine has been developed for a fixed frequency and intensity per unit of surface and for a fixed thickness of the chocolate film, leaving as variables the duration and temperature of the process. While the ultrasonic method is not yet suitable for the desired dehydration of the chocolate and the volatilisation of the acetic acid, the method is highly efficient in attaining the other objectives of conching, *viz.* the neutralisation of the tannins, the homogenisation of the different constituent aromas, and the development of the latent aromas. The chocolate substance must therefore be dehydrated before being subjected to ultrasonic treatment. Among the advantages claimed are the excellent quality of the product and a great saving in power consumption.

Special Fats for preventing Chocolate Bloom in the Manufacture of Coatings and Chocolate Substitutes and for the Stabilisation of Cocoa Butter. A. Herzer (*Gordian*, 1954, **54**, No. 1291, 24).—A German firm (Edelfettwerke, Hamburg) has developed a series of fats of a new type which are similar to cocoa butter in that they are soluble at body temperature, showing a light to medium hard cut, free from odour and taste, and capable of preventing chocolate bloom. Particularly interesting results have been obtained by mixing these fats with cocoa butter. With such mixture, it has, for instance, been found possible to produce coatings soluble at temperatures close to body temperature without reducing the viscosity typical for pure cocoa butter, but with a much smaller interval between the setting and melting temperatures.

The West German Federal Research Institute for Meat. H. Rievel *et al.* (*Die Fleischwirtschaft*, 1954, **6**, 387).—The Institute was founded in 1949 in the tradition of a former Reich Institute with similar functions, established shortly before World War II. Research in the past five years has included the tracing of polyphosphates in sausages, bacteriological examination of spices, research on preserving agents for small sausages in tins, the juice-retaining properties of meat, new sterilisation methods (rotary sterilisation) to improve the quality of meat preserves, and research on sausage manufacture, etc.

New Methods for the Disposal and Utilisation of Slaughterhouse Waste. F. Reinhold (*Die Fleischwirtschaft*, 1954, **6**, 405).—The author, a professor at Darmstadt Technical College, has investigated a proposal for the further development of the "bio-gas" principle in slaughterhouse waste digestion. With this system, slaughterhouse waste is decomposed in fermenting pits from which the decomposition gases are extracted as a source of energy. According to extensive laboratory tests, the quantity of gas thus obtained should be adequate to supply power for the slaughterhouse installations. Since the alkaline methane fermentation has high germicidal effect, the putrescent contents of the fermenting pits are virtually free from contaminating germs.

Chillroom Reconstruction at the Düsseldorf Slaughterhouse and Stockyard. H. Rose (*Die Fleischwirtschaft*, 1954, **6**, 401).—Description, by the Director of the Düsseldorf Slaughterhouse, of a new chillroom installation, operated in accordance with the modern rapid-cooling system and primarily designed to suit the requirements of shop butchers. The insulated cubicles are combined in blocks into which suitably controlled flows of cold air are blown. The installation is stated to have brought about a remarkable improvement in the quality and keeping property of the meat consumed in the city

News from the Industry

FORTHCOMING EVENTS

Society of Chemical Industry

CHEMICAL ENGINEERING GROUP

December 14. Six papers on "The Drying of Wheat Grain," by Prof. Ewan McEwan, 5.30 p.m., Geological Society, Burlington House, London, W.1. Joint meeting with the Institution of Chemical Engineers and the Institution of British Agricultural Engineers.

FOOD GROUP (Nutrition Panel)

December 8. "The Nutritive Value of Beer," by Dr. E. C. Barton-Wright, 6.30 p.m., Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1.

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Incorporated Plant Engineers

December 7. "Lighting in Industry," by Charles J. King, 7 p.m., 25, Charlotte Square, Edinburgh.

December 13. "Feedwater Treatment," by E. L. Streatfield, 7.30 p.m., Mathers Hotel, Dundee.

December 14. "Vacuum and Air in Industry, 7.15 p.m., Mackworth Hotel, Swansea.

December 15. "Steam for Process," by L. G. Northcroft, 7 p.m., Scottish Building Centre, 425, 427, Sauchiehall Street, Glasgow.

December 16. "Progress in Lamps and Lighting," by R. V. Mills, 7.15 p.m., Radiant House, Bold Street, Liverpool.

■

Institute of Packaging

December 6. "Design of Wooden Containers," by John Hope, 6.45 p.m., Royal Hotel, Cardiff.

December 13. "Printing of Paper, Film, and Tinplate," 6.30 p.m., Old Nag's Head Hotel, Manchester.

December 15. "Insurance in Transit," by J. Evans, 6.30 for 7 p.m., Peel Restaurant, Boar Lane, Leeds.

■

International Refrigeration Congress

After an interval of nearly 50 years, Paris will once again be the venue for the *Congrès International du Froid* to be held at the Sorbonne from August 31 to September 15, 1955.

The General Secretariat of the Congress will be at the headquarters of the International Institute of Refrigeration, 177, Boulevard Malesherbes, Paris.

Regulations have been issued from Paris governing the preparation and presentation of papers, which will cover all aspects of refrigeration technique and application.

■

2nd International Seaweed Symposium

Following the suggestion made at the First International Seaweed Symposium in Edinburgh in 1952, The Norwegian Institute of Seaweed Research (Norsk institutt for tang- og tareforskning) announces a symposium in Trondheim, Norway, in July 1955.

The symposium is planned for July 14, 15, and 16, and meetings will be held at Norges Tekniske Høgskole (NTH), Trondheim.

It is proposed to accept papers on the following main subjects: (1) Chemistry of seaweeds, including methods used in the study of seaweed products; (2) Technical subjects connected with harvesting and industrial exploitation of seaweeds; (3) Experimental studies of the nutritional value of seaweed products; (4) Algological studies on species which are used or may be expected to be used in industry.

The papers should preferably be presented in English. No papers will be read by title.

Correspondence relating to the symposium should be sent to Second International Seaweed Symposium, c/o Professor T. Braarud, Blindern. Oslo, Norway.

Changes of Address

The address of N. Cook and Son Ltd., manufacturers of *Cooksalt*, is now 129, Newfoundland Road, Bristol, 2. Telephone: Bristol 51226.

●

Bayer Products Ltd., manufacturers of the sterilising agents *Marinol* and *Marinol D*, have moved to large administrative headquarters at Neville House, Eden Street, Kingston-on-Thames, Surrey; Telephone: Kingston 7733. A small branch office remains at their former address at Africa House, Kingsway, London, W.C.2.

The company have factories at West Molesey and Byfleet, Surrey, and a biological institute at Exning, Suffolk. Their associated export company, Winthrop Products Ltd., also moves to the new headquarters at Kingston-on-Thames. Neither company has any connection with Farbenfabriken Bayer, of Germany.

■

The address of the Farmers' Central Organisation is now 50, Hans Crescent, London, S.W.1. (Telephone KNIghtsbridge 4421-5; telegrams FARMCENTRA, KNIGHTS, LONDON.)

This will also be the new address of the N.F.U. Development Co., Ltd., Federal Containers, Ltd., North Riding and Durham Egg Producers, Ltd., Nuclear Stock Association, Ltd., the Produce Prepackaging Development Association, Ltd., and the Credit Service Unit.

Milk Marketing Board is 21

Mr. Heathcoat Amory, P.C., M.P., Minister of Agriculture and Fisheries and Minister of Food, was the principal guest at a dinner given by the Milk Marketing Board at the Dorchester Hotel on October 21, 1954, on the occasion of the Board's 21st anniversary.

Replying to the toast of the Milk Marketing Board, Mr. Thomas Peacock, C.B.E., J.P., chairman of the Board, spoke of the early struggles of the Board and said that a stable and organised milk industry was a foundation of British agriculture. Of the achievements of the producers' side, Mr. Peacock mentioned the abundance and quality of the milk supply and said that on the whole the milk service to the consumer was excellent — probably better than it was in any other country in the world.

Other speakers included Sir James Turner, President of the National Farmers' Union of England and Wales, who paid tribute to the Board.

The guests at the dinner included Mr. George Brown, M.P., Sir Thomas Dugdale, M.P., Mr. Walter Elliot, F.R.S., M.P., Sir Alan Hitchman, K.C.B., The Viscount Hudson, C.H., Mr. J. K. Knowles, C.B.E., Major G. Lloyd George, M.P., Prof. Sir James Scott Watson, C.B.E., M.C., and Mr. Tom Williams, M.P.

Batchelor's Irish Company Prospers

Batchelor and Co. (Ireland) Ltd., have marketed in Ireland canned vegetable mayonnaise, a product not previously packed in the Republic. Besides having made first deliveries of canned butter beans not available hitherto on the Irish market for the last 15 years, the company has also introduced two new varieties in their range of packet soups that already include chicken noodle and cream of mushroom; these are cream of tomato and cream of celery.

These developments were announced by Mr. J. E. Lalor (chairman) at the annual meeting of the company in Dublin.

The total turnover was higher than in the previous year, Mr. Lalor said, an increase in home trade off-setting a further decline in export activity. Net selling prices of a number of their products were now lower than those for corresponding products in England despite the higher cost of some raw materials and packing materials. The whole of the year's output of fruit and garden peas had been reserved for distribution at home, he stated, adding that although there were more remunerative export prospects for these goods, the primary obligation of the company was to the home market.

New Lancashire Factory for H. J. Heinz

H. J. Heinz Co. Ltd. have purchased a 130-acre site at Kitt Green, Lancs., for a new factory (see FOOD MANUFACTURE, Nov., p. 453). The costs which will be incurred in developing and equipping the site and buildings are estimated at £2,500,000. The Kitt Green factory will ultimately take the place of the present Standish factory situated about four miles distant, but will be additional to the main factory at Harlesden in North-West London.

In 1946, increasing demand for the company's products emphasised the urgent need for increased manufacturing facilities. Government restrictions precluded the erection of further buildings at Harlesden and eventually a Government factory at Standish was leased. Although the terms of the lease entitled the Ministry concerned to the right of re-entry it was hoped that a removal of this clause could be negotiated later. Despite discussions with the Ministry over the last three years the company's application for a removal of this clause, however, was finally rejected.

Looking ahead the company foresaw the necessity of maintaining up-to-date production facilities at Standish and of incorporating the latest technological improvements and building layouts which would inevitably involve additional investment. It was clear that such investment could not be considered on a site which had no security of tenure. It therefore becomes essential to transfer the Standish production facilities to a site where security is ensured. The existing production of the Standish factory can be transferred by stages and the present staff absorbed. Therefore the ultimate closure of Standish will not endanger the security of the staff or the continuity of their jobs.

The site is adjacent to the area from which the company obtains its present agricultural produce and use will continue to be made of the fertile land in the Ormskirk district of Lancashire.

It is intended in due course to manufacture at Kitt Green the full range of the 57 Varieties. The proximity of the Wigan/Southport railway line will facilitate provision of sidings and the factory will be within easy reach of Liverpool's docks—of special significance and importance in view of the company's big export trade and its plans for expansion of this trade.

In the foreseeable future the output of the new factory will equal that of the company's main factory at Harlesden, London.

The company has come a long way since 1886 when the first consignment of 57 Varieties was sold in this country. The first English sales branch was established in 1896, and in 1925 the company moved to Harlesden, where they now employ nearly 3,000 people.

Deep Freeze Prospects in Scotland

A deep freeze plant which has been put into operation at Campbeltown by P. Macpherson and Sons is said to be the first plant of the type in this part of Scotland. Daily throughput capacity is 2½ tons and storage capacity 10 tons.

The possibility of developing mackerel-shark fishing on a large scale has been mooted in Scotland, following on the experimental trip sponsored some months ago by the White Fish Authority. Crux of the position is perhaps the provision at economic rates of deep freezing facilities similar to those enjoyed by the Danes and the Norwegians who are working this business. They have followed a policy of freezing surplus carcasses in the season, so that the supply can be maintained over the off-season at prices higher than those applying in gluts. The industry has been a seasonal one but has been regulated by the use of freezing facilities. If Scottish fishermen can be provided with similar deep freeze facilities and at the same prices as those enjoyed by the Scandinavians, the sponsors see no reason why mackerel-shark fishing should not develop into a substantial trade. The bulk of the market is in Italy, where the skin is used for bags and shoes and where the flesh is also processed.

Wall's New Sausage and Pie Factory

Building is well advanced at a new four-storey meat-products factory for T. Wall and Sons, Ltd., due to be completed at Godley, near Hyde, in August next year at a total cost of about £650,000.

Mr. J. D. O. Knowles, the firm's resident director, said that, when working to full capacity, the new factory will employ between 400 and 500 workers and will be capable of producing at least 300 tons of sausages and meat-products every week. Eventually, about 150 tons of meat will be required each day to keep the departments supplied. It is estimated that the new factory, which, it is claimed, will be "the most modern in the world," will daily consume over 100,000 gal. of water and more than 100,000 lb. of steam. The refrigerating plant will have a capacity equal to freezing 240 tons of water per day.

More than 20,000 tons of earth had to be removed from the site, which is on a hillside, to enable the foundations to be laid.

Plans are being prepared for Horrocks Bakery, Ltd., to carry out extensions to their bakery in Goodier Street, Newton Heath, Manchester.

ERECTIONS AND EXTENSIONS

Permission is being sought by Symbol Biscuits, Ltd., to proceed with plans for the construction of new extensions to their factory at Devonshire Road and Mansfield Road, Blackpool, Lancs.

*

Gainsborough Chocolates, Ltd., have submitted plans to the local authorities for the construction of an extension to their factory on Hainault Industrial Estate, Dagenham, Essex.

*

R. Paterson and Sons, Ltd., 111-141, Greendyke Street, Glasgow, C.1, are seeking permission to build four-storey premises on a site in Greendyke Street. This new building would comprise a factory for the manufacture of coffee essence.

*

Rowntree and Co., Ltd., chocolate and cocoa makers, of York, have purchased a site at Fawdon, Newcastle-on-Tyne, for the proposed erection of a new factory expected to cost £1,000,000.

*

Fromac Ltd., of Fraserburgh, one of the Mac Fisheries group, is planning an extension which will double its capacity. Approval of the project remains to be finalised by the parent company, and the local Town Council has indicated its full support in any development. Since its origin in 1946, Fromac has expanded to become one of the largest quick freezing organisations in Scotland; the company handles a very wide range of food products but specialises in poultry processing and fish freezing.

Night Shift for Pig Slaughter

In order to deal with the large numbers of pigs now being offered by farmers throughout the Home Counties, Wall's have for the first time in their history instituted a night shift at their Willesden slaughterhouse.

It is estimated that this development will increase the number of pigs slaughtered by almost 50 per cent. The majority of the additional animals thus handled will go to the adjoining meat products factory.

The demand for sausages has risen so sharply since the decontrol of meat that it has been found necessary to extend the sausage department and new premises are now being built on the Friary site at Acton from which the meat products business was transferred to a new factory at Willesden four years ago.

Seasonal redundancy in the adjoining ice cream factory at Acton will now be virtually eliminated, men and women being transferred from ice cream to sausage production during the winter.

Carry-Pack Lifting Handle

Following the introduction of the new *Carry-Pack* handle 18 months ago for use by retail shops and departmental stores for attaching to their customers' parcels, Paynes of Nottingham have now produced a cheaper utility type of similar handle for the easier and speedier unpacking of goods from cartons or containers.

The handle consists of a strip of gummed paper combined with a handle of strong cotton tape and it will lift a parcel weighing as much as 40 lb.

While it is particularly suitable for attaching to the middle carton of chocolates, confectionery, or foodstuffs which can easily be damaged when taking the initial package out of a tightly packed outer carton, it also serves the useful purpose of lifting heavy goods such as spare parts, etc., which, when packed in a strong inner carton, are all the more difficult to lever out without tugging, shaking, or levering, with consequent damage to finger nails.

Suitable dispensers are available and the company's maintenance service ensures that these are all kept in working order.

Telcothene Coated Paper

The name *Telcothene* is used by the Telegraph Construction and Maintenance Co., Ltd., for a range of polythene and polythene based materials produced in a number of forms. Among these is its application as a coating to a variety of papers and light gauge boards. For the packaging of food it offers a number of features: it has an excellent performance as a moisture barrier and may be used with safety in both tropical and frigid climates; it is non-toxic and may be heat-sealed; by virtue of its behaviour in resisting fracture at sub-zero temperatures, experiments have shown that *Telcothene* may be used to advantage in the manufacture of containers for frozen food packaging.

It will also provide adequate protection to hygroscopic foods during storage and transit and equally will prevent loss of moisture where this is undesirable.

Plastic Advertising Displays

An exhibition showing the various methods of fabricating plastic display signs, demonstrating new effects in colour and lighting, and new uses of *Perspex* and rigid p.v.c. was held recently at the Tea Centre, London. The opening ceremony was performed by Lt.-Col. Alan Wilkinson, D.S.O., M.A., President of the Institute of Incorporated Practitioners in Advertising. The organisers of the exhibition were I.C.I. Plastics Division, who have issued an attractive booklet which illustrates and describes the plastics on show.

"ZIP OPENER" FOR CARTONS.—A pressure-sensitive cotton adhesive tape, called "Rippatape," for the speedy opening of corrugated containers has been introduced by P. P. Payne and Sons Ltd. The tape is applied to the inside of the carton blank incorporating an "H" slot and a "lift and pull tab" on the outside of the carton. When the tab is pulled and continuous pressure exerted, the tape cleanly cuts its way through the wall of the container along a line determined by the placement of the tape. Carton manufacturers' machinery can be adapted by Payne for the application of "Rippatape." An applicator attachment is in the course of production for applying on carton blanks, when it is not desired to attach the tape on the corrugator itself.

Board Making at Warrington

Thames Board Mills Ltd., whose new 135 in. board making machine is in production at Warrington, now announce that this is part of a £9,000,000 scheme of extensions to the Warrington plant. An additional board making machine (No. 10) is to be installed, together with a new factory covering 250,000 sq. ft. for the manufacture of solid and corrugated *Fiberite* cases. When completed, these extensions will raise the company's manufacturing capacity to nearly 500,000 tons of board and 125,000,000 fibreboard cases a year.

The company now aim not only to retain their leading position in the production of board and fibreboard cases but also to ensure that adequate capacity is available to meet the constantly growing demand for cardboard for packaging. A further object is to cater for the requirements of the British carton and folding and rigid box trade so that this country will be less dependent on imported supplies.

The extension of manufacturing facilities to the Warrington plant will enable improved service to be given to customers in the north, since there will be a complete integration of processes between the adjacent board mill and the new packing case factory. Machinery to be installed includes laminating machines, corrugators, and high-speed semi-automatic case making machines of the latest kind. It will in fact produce on lines similar to those operating at the large packing case factory at Purfleet.

To accommodate steam and power requirements for present and planned extensions, additional high pressure boilers and turbo-generators have already been installed at Warrington; storage space for raw materials and finished products has also been increased.

Cookery Enquiry Centre

Set up primarily to deal with enquiries from housewives, cookery writers, students, and domestic science workers, and to supply authoritative and up-to-date information on cooking problems in general and on *Spry* in particular, the *Spry* Cookery Centre has now been opened in London.

As well as answering queries sent in by the general public, this well-equipped Centre will provide a regular flow of tested recipes and cookery hints to domestic science teachers and cookery demonstrators throughout the country.

The kitchen provides facilities for cooking by both gas and electricity and the problems of hygiene, storage space, lighting, and ventilation have been worked out by Mr. Trevor Dannatt, A.R.I.B.A., one of the leading authorities on kitchen design and interior planning.

Another feature of the Centre is the demonstration room where lectures and demonstrations on the latest cookery methods will be given.

Bakery Research Association's Annual Meeting

THE SMALL BAKER IS NOT FORGOTTEN

The rôle of the British Baking Industries' Research Association was discussed by the chairman, Dr. R. T. Colegate, at the annual meeting in London on October 21. Some people thought the association should concentrate on long-term research but he disagreed. He thought the staff should investigate individual members' problems because these might well give clues to fundamental research. Thus, he was pleased to record that during the past year there had been more visits by staff to members, present and prospective. More members were needed because of the loss of members caused by the amalgamation of businesses, and Dr. Colegate appealed to all present to help raise the membership. Apart from practical advice, the Association could help because it was in direct contact with the authorities who made the laws on preservatives, antioxidants, colours, etc., and in making representations it helped the whole industry.

Dr. J. B. M. Coppock, director, said his staff were doing all they could to help small bakers and they had a thorough investigation under way. Their findings would be published as a handbook.

Three lectures were given. The first, by Dr. Coppock, was on the manufacture of bread from unbleached and untreated flour. A study had been made of the Blanchard process in which a conventional dough machine is speeded up to mix at twice the normal speed. Many variations on this process had been tried. It had been carried out in a high-speed mixer without fermentation of the slack dough and similarly in the speeded-up conventional dough machine. All these methods had given good bread. Recently, straight doughs over-mixed in the same way had given most promising results.

In the second paper, Mr. F. J. H. Ottaway dealt with biscuit packaging, now a matter of considerable research owing to the change from the 9 lb. tin to the ½ and 1 pound packs. Two problems were (*a*) the ability of biscuits rapidly to absorb water vapour, and (*b*) the development of off-flavours such as oxidative rancidity. An attempt had been made to develop a relationship for forecasting shelf life. To prevent rancidity the use of non-absorbent packaging material was recommended. Wrapping paper incorporating anti-oxidants was promising but at present its use was not permitted.

The final paper, on the evaluation of cake flours, was given by Mr. J. J. Devlin. (It is published in this issue (p. 479) so no summary is necessary here.)

After the technical session, the annual luncheon was held, the chief guest being Sir William Ogg, director of Rothamsted Experimental Station and president of the Society of Chemical Industry.

COMPANY NEWS

Subject to completion of audit, **Glaxo Laboratories Ltd.** announce that the profits of the Group for the year ended June 30, 1954, amount to £1,484,000 (£1,585,025) after providing for all charges including £1,227,000 (£1,238,000) for U.K. taxation. The proportion of these profits attributable to outside shareholders is £21,000 (£5,000). Group profits include trading profits of previous years £13,000 (£3,814). Last year the charge for U.K. taxation took account of an over-provision of £150,000 in previous years.

One of the proposals of the directors will be to recommend a final dividend of 15 per cent. on the Ordinary Stock (making 20 per cent. for the year) compared with 12½ per cent. (making 17½ per cent.) last year. The final dividend requires £131,398 (£109,498) after income tax, payable on December 7, 1954, leaving £420,000 (£375,997) to be carried forward.

The directors also announce that it is proposed to increase the Authorised Capital to £5,000,000 and, subject to the consent of the Capital Issues Committee, to capitalise £1,592,700 of the reserves of the company, and to issue to the Ordinary Stockholders one share of 10s. for every 10s. unit of Stock now held by them. The purpose of this issue is to bring the nominal capital into closer relationship with the capital actually employed in the business.

*

The directors of **Weston Foods Ltd.** announce in respect of the period from March 29, 1953, to April 3, 1954, consolidated net profits of the Group of £982,122 (against £1,378,542 last year) after all charges including depreciation £171,317 (against £146,024). The profit applicable to the company's holdings, after taxation £478,257 (against £731,787), is £503,865 (compared with £646,755 last year).

There has been declared an interim dividend of 45 per cent., free of income tax, on the Ordinary share capital (against dividend of 30 per cent. and bonus of 30 per cent., free of income tax) for the period.

In the company's accounts there has been appropriated £68,019 to general reserve (against £50,000 to general reserve and £25,803 to depreciation reserve) and, after providing the dividends for the period, there is a balance of £103,856 (against £97,760) to carry forward on the consolidated profit and loss account.

The whole of the ordinary share capital is held by the parent company, Allied Bakeries Ltd.

*

The directors of **Allied Bakeries Ltd.** announce in respect of the period from March 29, 1953, to April 3, 1954, consolidated net profits of the Group of £4,523,994 (against £4,678,529 last year), after all charges including depreciation of £1,115,373 (against £1,007,359). The profit applicable to the company's holdings, after taxation £2,606,948 (against £2,879,525), is £1,827,589 compared with £1,714,273 last year. As already announced, dividends equivalent to 22½ per cent. on the present Ordinary capital have been declared (against 30 per cent. last year, before the 100 per cent. bonus issue).

Appropriations by subsidiary companies total £223,248 (£288,647 last year) and in the company's accounts there has been appropriated:

£43,880 in respect of costs of acquisition and increase of capital, etc. (against £1,498).

£364,242 to depreciation reserve (against nil).

£58,215 to reserve in respect of goodwill (against £87,449).

£748,213 to general reserve (against £1,098,759).

£41,984 for Preference dividends (against £40,073).

£346,055 for Ordinary dividends (against £227,208).

The balance carried forward on the consolidated profit and loss account is £554,821 against £553,069 brought in from last year's account.

*

Continued improvement in food supplies and a probable downward trend in prices were forecast by Sir Rolande Wall, M.C., chairman of **Lovell and Christmas Ltd.**, at the company's 58th annual general meeting. Recent experience had shown that although the demand for butter was not so great as some people had anticipated when rationing ceased, the reduction in price was steadily increasing the off-take.

Although Russia continued to buy heavy quantities of butter, ample supplies should be available to meet the consumer demand in Britain at about present prices, and it remained to be seen what the ultimate destination of the U.S. surpluses of dairy products would be.

Sir Rolande spoke of the difficulties of adjusting the administration of a big organisation after 14 years of dealing with permits and ration documents.

APPOINTMENTS AND RETIREMENTS

Mr. G. Johnstone has relinquished his appointment as managing director of Thames Board Mills Ltd. consequent upon his retirement from active business. Mr. L. A. Lewinton has been appointed managing director and Mr. J. Scott deputy managing director.

Mr. Johnstone's service with the company started in 1912 and for many years his interests lay on the sales side of the business. In 1939, he was appointed director and in 1952 managing director.

He was presented with an inscribed gold cigarette case by the employees as a token of esteem and at a function on October 1 at the Savoy Hotel, London, he was entertained to dinner by the chairman and co-directors.

*

Mr. F. C. Rowsell, B.A., A.M.I. Mech.E., has been appointed chief engineer to British Industrial Plastics Ltd. on the retirement of Mr. T. H. Gant, who has been appointed advisory engineer with special duties.

*

Mr. G. P. E. Howard, a director of the company and hitherto general works manager, has been appointed general sales manager of Hayward Tyler and Co. Ltd. The firm, whose headquarters are at Luton, have just opened a branch factory at East Kilbride, Lanarkshire. They make bottling machines, carbonators, and syrup mixing plant for the carbonated beverage industry.

*

Mr. F. R. Francis has been appointed to succeed Mr. Fred J. Bull (who will retire at the end of the year after 45 years' service with the Association) as Secretary of the British Dairy Farmers' Association as and from January 1, 1955.

*

The National Association of Multiple Grocers announces that Mr. A. Norman James, J.P., F.G.I., who was a deputy chairman of the association, has been elected chairman following the sudden death of Mr. R. C. Blunt. Mr. James, who has served on the council of the association for many years, is also chairman of the North-Western Multiple Grocers' Association.

Mr. James is managing director of John Irwin Sons and Co., Ltd., multiple grocers, whose headquarters are in Liverpool. The company operates 206 branches on Merseyside and in North Wales and was founded by the late Mr. John Irwin in 1874.

Mr. James is keenly interested in church work and takes an active part in the affairs of the Congregational Denomination.

OBITER DICTA

● The first person to make bread from wheat is said to be a Chinese named Ching-noung who lived about 2000 B.C.—*International Federation of Agricultural Producers.*

● Scientific research has now proved that it isn't the caffeine in coffee that keeps you awake, it's the price.—*A broker paying his 2s. bill for two coffees in a City café.*

● Surprise your family with a new one-dish dinner! This combination of pork hocks, sauerkraut, and potatoes gets added zest from caraway seeds and tart apple. — *American Meat Institute.*

● The difficulty of loading the chewing gum machines is compensated by the psychological value of having something for a penny.—*Mr. A. Parmenter, London manager of the firm who own nearly all the slot machines in the country.*

● Millionaire George Dawson found himself involved in the "gold hunt" when police searched a safe-cum-filing cabinet which was being removed from his offices in Berkeley Square. It was forced with a crowbar. Inside was . . . a tin of herrings. — "*Sunday Express.*"

● Eire does not want to be known as part of the British Empire. Why should we help her by labelling her meat as "home-killed" and so enable her to get a better price?—*Mr. F. Tame at the annual meeting of the National Federation of Meat Traders' Associations.*

● Women are starving themselves and carrying the thing too far on the table for the rest of the family. If we are going to survive the problems of today and fight for our liberties on our stomachs, these stomachs had better be damned full.—*Mr. Bill Thie, President of the Associated Retail Bakers of America.*

● Britons make history by being beef eaters. Why slim and be anaemic? Eat meat and be healthy. You have never heard of a boxer who trained on peanuts — they eat meat. You have never heard of a beauty queen saying she was a vegetarian. For beauty and vigour — take beef. — *Mr. F. Henson, addressing the National Federation of Meat Traders.*

OBITUARY

Mr. Richard Righton Webb, the treasurer of W. J. Bush and Co. Incorporated, on October 7.

Mr. Webb, who was a grandson of the founder of W. J. Bush and Co., joined the parent company in 1921 and transferred to the incorporated company in 1923, becoming its chief executive within the United States as from 1929.

He was appointed a director of W. J. Bush and Co., Ltd., and of W. J. Bush and Co. (Canada), Ltd., in 1942.

*

Mr. Alec Nathan, the founder of Glaxo and its former chairman, in London on October 18. Born at Wellington, New Zealand, in 1872, Mr. Nathan was the sixth son of Joseph Edward Nathan, a pioneer colonist.

In his early years, Mr. Nathan took up farming in New Zealand with a brother and a few years later entered the family business of Joseph Nathan and Co., where he was placed in charge of the early milk drying operations.

In 1908 he came to England to develop the use of dried milk as an infant food and succeeded in establishing Glaxo not only in the United Kingdom but also in various world markets.

Mr. Nathan became chairman of the company in 1927 and held that office until his retirement in 1945. During this period he saw Glaxo Laboratories grow into an influential pharmaceutical group.

In 1941, Mr. Nathan was awarded the Bledisloe Gold Medal, which goes each year to an ex-student of Lincoln Agricultural College, New Zealand. Lord Bledisloe, who instituted the Medal when he was Governor-General of New Zealand, wrote to Mr. Nathan: "It is a great and outstanding distinction and an evidence of the high repute in which you and your company are held in the Dominion of New Zealand."

Throughout his life Mr. Nathan possessed boundless physical energy. Last year he underwent a serious operation and his health began to fail. But to the end he continued to take a deep interest in the affairs of the business he had pioneered and the men and women engaged in it.

He married in 1909, Muriel, daughter of Wilfred Marks. She survives him with two sons and a daughter.

S. W. Smedley's Portrait

A ceremony took place in the Board room of the National Canning Co. on October 6, when Mr. S. W. Smedley, founder of the Smedley Group of companies, was presented with his portrait in oils. Mr. Smedley founded this well-known group of companies in 1924 and relinquished the chairmanship in January, 1953.

Poultry on Show

The annual meeting of Britain's poultry keepers, now producing over 500,000 tons of eggs and 100,000 tons of poultry meat annually, valued at over £150 million, will be held at Olympia on December 8, 9, and 10.

Among the exhibits will be a complete packing station showing the preparation of birds for marketing—from plucking to deep- and quick-freezing—and three fully equipped kitchens giving daily cooking demonstrations.

In the table poultry section, there are to be 295 competitive classes, including all standard breeds of chickens, turkeys, ducks, and geese, with prizes valued at over £2,000.

A Convention, including sessions staged by six organisations representing all branches of the industry, will run concurrently.

H_2O_2 as a Cream Preservative

The suggestion that hydrogen peroxide added as a preservative to synthetic cream would lessen the risk of food poisoning was made by Dr. Betty Hobbs at a meeting of the Food Group, Society of Chemical Industry, in London on November 24. She said that many outbreaks of paratyphoid fever and salmonella food poisoning had been considered to be due to the contamination of synthetic cream by human or animal carriers; or by some other contaminated foodstuffs used in the bakery. While the factory could produce a relatively pure product the manipulative processes in the bakery provided opportunities for contamination and nutritive material from confectionery diffusing into the cream provided an excellent medium for growth even when the cream itself would not have supported growth. The problem was how to protect the public against such a vulnerable foodstuff — one which is eaten uncooked after indefinite periods of storage at room temperature.

A harmless inhibitory substance such as H_2O_2 added to the cream during production would lessen the risk of food poisoning from the cream: such an addition would at present conflict with the Public Health (Preservatives, etc., in Food) Regulations, although these were now being reviewed by the Preservatives Committee of the Food Standards Committee.

Sanitary Inspectors Visit Crawley Factory

A party of 36 members of the South Eastern Centre of the Sanitary Inspectors' Association visited the Crawley factory of the A.P.V. Company on October 7. The visit was arranged to enable the members to study the methods used in the production of plant for the dairy, brewery, and food industries.

New "Frood" Lines

Two new frozen foods have been introduced by the *Frood* Department of J. Lyons and Co.—*Vol-au-Vent* and braised beef.

The *Vol-au-Vent* ready for the caterer to bake is now on sale in the greater London area and will be made generally available shortly.

It should be of great use to the busy caterer, since it eliminates the difficulties of producing high quality puff pastry as required. Moreover, it enables the caterer who does not employ or cannot obtain skilled pastry cooks to serve an attractive range of puff pastry goods.

The unbaked *Vol-au-Vents* are frozen, packed 80 to a bag, and cost 2½d. each. At this price, the product should have wide appeal to the catering industry including industrial canteens, hospitals, and Schools. It enables the caterer to serve a quality puff pastry in which can be used all fish, meat, chicken, and cheese trimmings. It is also ideal for easily served sweets such as fruit or jam puffs. The *Vol-au-Vents* can be baked from the frozen state in 25 minutes, or, if defrosted, in only 20 minutes.

The sliced braised beef is the latest addition to the retail range of *Frood* products; it costs 1s. 6d. per portion. The meat is contained in a shallow aluminium foil "tin" in which it can be re-heated without further attention. The outer cardboard carton sets the seal on the design for similar future new items with a straightforward panel with the product name on an orange ground broken up with white lines.

To maintain uniformity of style, the colour of the carton will indicate the different contents.

The braised beef, surrounded by its own special sauce, can be prepared in the oven from frozen state to table in a maximum of 20 minutes.

Cherries with Semolina

Trufood Ltd. are expanding their Spoonfoods range of strained and homogenised foods by the addition of a new "sweet," Cherries with Semolina. Made from cherries, sugar, semolina, and citric acid, the new variety is packed in glass jars and retails at 9½d.

A new catalogue published by J. H. Fenner and Co., Ltd., illustrates the products manufactured by their oilsealing division, which trades under the name of the Pioneer Oilsealing and Moulding Co., Ltd. The catalogue deals comprehensively with every aspect of the installation and application of oil seals, including recommendation and advice on the use of the various types. A fully dimensioned list of standard oil seals is included and considerable data are given on specialised types.

Presentation of B.E.M.

Mr. Gwilym Lloyd-George, M.P. (formerly Minister of Food and now Home Secretary and Minister for Welsh Affairs), on behalf of the Queen, has presented the British Empire Medal to five people whose names appeared in the Birthday Honours List.

Details of the awards are:

Mr. Charles James Etheridge, aged 62 years, a chargehand at the British Sugar Corporation's factory at Cantley, Norfolk, where he has been employed for 34 years. During the annual sugar beet campaign, which lasts from October to January, the Corporation's factories are operated day and night, and much depends upon the efficiency of the chargehands. Mr. Etheridge has served on the Works Advisory Council and the committees of the factory Sick and Dividend Club and the Sports Club Benevolent Fund.

Mr. Thomas Joseph Hill, aged 63 years, storeman at the Ministry's potato sack depot at Ely since 1945. The store, which he controls, handles approximately 12 million sacks annually.

Mr. Harry Phillips, aged 55 years, a senior meat porter at the Wolverhampton depot of the Wholesale Meat Supply Association throughout meat rationing. By his good spirit and energy, he encouraged and stimulated the other porters with whom he worked, which materially assisted the Ministry in supplying home-killed meat to London. Mr. Phillips is now employed by Swift and Co., Ltd., meat importers.

Mr. Thomas Henry Singleton, aged 76 years, was appointed Quay Superintendent to the Liverpool Port Dried Fruits Office in June, 1940, and for 13 years supervised the landing and warehousing of cargoes of dried fruits arriving at the port. This demanded constant attendance at the dock, often at week ends and sometimes during air raids. He is now employed by J. C. Houghton and Co. (Liverpool), Ltd.

Mr. Alfred Turner, aged 43 years. As slaughtering demonstrator for the Ministry at Aldershot, Mr. Turner gave enthusiastic service, often outside the normal range of his duties, in helping to overcome problems caused by outbreaks of foot-and-mouth disease. He is now self-employed.

Cold Storage Resignation

Mr. J. A. Robertson, O.B.E., Director of Cold Storage at the Ministry of Food, left the Ministry's service on October 31 to take up a post with the Union Cold Storage Co. Ltd. The Minister has put on record his appreciation of Mr. Robertson's valuable services over a period of 15 years.

Mr. Robertson, who is 50, will be succeeded by Mr. W. A. Gair.

World Food News

Preserved Fruits Duties in India

The Indian Government is to continue protection in respect of preserved fruits for a further period of two years from January 1, 1955, at substantially the existing rates of duty.

Swiss Control Milk Imports

To protect domestic production, the Swiss Federal Council have issued a decree by which dealers may import only half as much foreign powdered and sterilised milk as they accept from Swiss producers. The annual average of Swiss imports of powdered milk and condensed milk during the years 1937 to 1939 was 77 tons and five tons respectively. The corresponding figures for 1953 were 2,500 and 1,600 tons.

New Abattoir for Bechuanaland

Sir John le Rougetel, the British High Commissioner for Basutoland, Bechuanaland, and Swaziland, has opened a £750,000 abattoir at Lobatsi, Bechuanaland Protectorate.

It was announced at the official opening that the number of cattle in the Protectorate had increased from 837,000 to more than a million, and that exports had increased from 43,000 head to 75,000. Arrangements had been made to market meat in South Africa, the Rhodesias, and the Belgian Congo.

The abattoir contains cold storage plant and will process the major part of Bechuanaland's annual surplus.

New Semolina Product

Normally prepared from durum and common hard wheat, a type of semolina product has recently been evolved from soft wheat by the Indian Central Food Technological Research Institute, Mysore.

Semolina consists of granules of the floury part of the wheat which do not pass into flour in milling, and, imported to the value of Rs. 1,200,000 during the year 1952-53, is preferred to flour in the Indian rice eating areas.

As produced at the Indian Food Institute the semolina-type product is obtained by soaking the wheat in water at 30°C. for 30 minutes, draining off the water, parboiling it by steaming for 30 minutes at atmospheric pressure, and drying. The parboiled wheat is then milled to remove bran and germ and finally converted into the semolina product by coarse grinding.

Consumer trials revealed that the preparations made from the products were similar to those obtained from hard wheat semolina both as regards taste and consistency.

Equipment used for growing radioactive algæ at the Argonne National Laboratory. By introducing lactic acid into a flask containing radioactive barium carbonate, as shown, radioactive CO_2 is released and pumped into the culture medium of algæ. The algæ utilise the CO_2 for photosynthesis, thereby becoming radioactive. Oxygen liberated by the algæ is removed from the system by a titanium compound. Radioactive algæ produced by this method will be used in food research.

Radioactive Algæ for Food Research in the U.S.

Algæ have been irradiated at the Radiobiology Experiment Station (isotope farm) of the Argonne National Laboratory, U.S.A. The radioactive material will be used by scientists to further knowledge of food research and life processes. Two methods of use have been proposed. One is the use of radioactive algæ as food for experimental animals in order to learn the rate and the amount of deposition of radioactive carbon in the organs of the body, and as an aid for the production of radioactive compounds that are peculiar to animal metabolism. The other is concerned with the use of radioactive carbohydrates, fats, amino acids, and other organic compounds which are manufactured by the algæ themselves. Since these compounds are "tagged" with radioactive carbon atoms, it is possible to detect them at trace levels. It is hoped that the studies will indicate how animals use these compounds for growth.

Quick-frozen Fried Fish

One of the fastest-selling quick-frozen food items in the United States at the moment is the fried fish stick. Observers of the American fish trade think that the sticks will open up important new outlets for sales and markedly increase the annual *per capita* consumption of fish from the existing 11 lb.

Much of the appeal of the new item derives from the fact that nutrition, flavour, menu versatility, economy, and general convenience are such obvious qualities. A single package containing fully prepared sticks of uniform shape, size, and thickness, ready to heat and eat or even serve cold, are very popular. Contents are 100 per cent. edible and can be evenly portioned to exact serving size and number.

A number of brands are now on the market in America — Snow Crop, Birds Eye, Libby, Fulham, Gorton Pew — to name only a few. Noting the success of the item, the Marathon Corporation have produced a standard design overwrap for the products, with a rotogravure printed wrapper carrying a sparkling picture of the product. Flexibility has been made the main feature of this new frozen food package wrapper; a packer can vary the weight and may imprint his own net weight announcement if desired.

OVERSEAS ENQUIRIES

Kola Tonic and Cider

E. P. Gibbs Ltd., 17, Charlotte Street, Port-of-Spain, Trinidad, are interested in representing, as sole distributors, a United Kingdom manufacturer of kola tonic and non-alcoholic cider. Offers should be sent, with full details, direct to the company.

*

Boiled Sweets, Jams, Marmalades

Paul Ries and Sons Ltd., P.O. Box 723, Addis Ababa, are interested in obtaining from United Kingdom firms sole distribution rights for boiled sweets, fruit and honey sweets, and jams and marmalades.

Firms interested in this enquiry should write by air mail direct to the Ethiopian firm giving full particulars including delivery dates and prices f.o.b. United Kingdom port and c.i.f. Jibuti.

*

Sausage Making Machinery

The Sugardale Provision Company, McKinley Ave. and Penna R.R., Canton, Ohio, are interested in the importation of sausage making machinery for use in their own meat packing plant. The U.S. firm believe that United Kingdom machinery for sausage making has certain new features not found in U.S. manufactured machinery.

Firms interested in this enquiry should communicate by air mail with Mr. Carl Lavin of the U.S. firm, enclosing full particulars of their products, with trade literature, and giving full details of deliveries. Prices should be quoted in U.S. dollars c.i.f. Cleveland or east coast ports.

*

Confectionery for the U.S.

Mr. John O. Huber, 210, Redwood Street, Baltimore, Maryland, would like to represent U.K. manufacturers of confectionery.

He feels that he would be able to market considerable quantities of boiled sweets, provided the quality, packing, and prices were right.

The sweet trade in the U.S.A. appears to be divided into four categories:

1. *Penny line (or 1 cent) and 2 for 1 cent line—fruit and chocolate flavoured caramels.*

This line is packed in 80 count (80 individual packages) containing four separately wrapped caramels with a cellulose overwrap, and priced at 50 cents per box of 80 to the jobber. Also packed in box of 120 count offered to the jobber at a price of from 70 to 75 cents, depending on the grade of sweets.

The penny line represents from 25 to 30 per cent. of the entire annual volume of business for sweets, which is estimated at about one billion dollars.

2. *Five cent line — chocolate bars with various flavoured fillings.*

This line is the largest seller, representing approximately 60 per cent. of the annual volume of business. The bars are packed 24 to the box at 75 cents per box to the jobber.

The ten cent line is also packed 24 bars to the box and is supplied to the jobber at from $1.44 to $1.50 per box.

3. *Boiled Sweets.*

These sweets, with an individual cellulose wrapping and packed in cellulose bags, represent about 10 to 15 per cent. of the annual sweet trade. Some are sold in cardboard display packages with a transparent window for observation of the contents. This type of sweet is also sold in tins.

4. *Toffees in cellulose bags and boiled sweets in small packs.*

This category is composed of what is known to the trade locally as the "Vending Pack," "Theatre Pack," and "Chain Store and Supermarket Pack."

The "Vending Pack" and the "Theatre Pack" are dispensed out of automatic vending machines. They comprise the normal 5 cent and 10 cent sweets packed in plain cardboard boxes containing 100 pieces and sold to the machine operators.

Mr. Huber is also interested in establishing contact with manufacturers of small round boiled sweets packed in a tube-like cellulose wrapping.

The packing of the sweets required should be similar to that required by popular demand in the United States.

Manufacturers interested in this enquiry should write direct by air mail to Mr. Huber, enclosing samples and price lists, quoting in dollars c.i.f. Baltimore or New York.

*

Food Specialities

Fabriken Cardia Akts., Oehlenschlaegersvej 6, Odense, Denmark, are interested in representing United Kingdom manufacturers of food specialities on a commission or purchasing on consignment basis. They are also interested in obtaining the right to manufacture on a licence basis.

The company are agents in food specialities, and manufacturers and distributors of various items of food, including cake mixtures, soups, syrups, marshmallows, candy peel, and bakers' sundries. They have 23 salesmen who cover the whole of Denmark selling to both retailers and wholesalers.

Manufacturers interested in this enquiry should write direct to Fabriken Cardia Akts. giving full details of their offers.

Coffee Situation Improves

The world coffee situation has improved recently, according to the International Federation of Agricultural Producers, it is reported from Washington.

Revised estimates of the 1953-54 crop place production at 41·4 million bags (of 132 lb. each). This figure indicates there was no decline in coffee production despite the severe frosts in Brazil. The outlook for 1954-55 is slightly better than the current year, and production is estimated at 41·7 million bags. This is about 13 per cent. higher than the post-war average.

The U.S. Foreign Agricultural Service says it is believed the marketing season of 1954-55 should be the last season in which there will be a near balance between production and consumption. It is expected in future more coffee will be grown than people will drink.

Venezuela's New Rice Processing Plant

Additional processing facilities are to be provided by the Development Corporation for Barinas State, the second largest rice production area in Venezuela, by the installation of modern hulling and drying plant.

In the new plant, now being built and equipped by the Socam Company of Paris at an estimated cost of $1,440,000, 330,000 lb. of rice can be processed every 24 hours, or 30,000 metric tons a year. The plant comprises a drying machine, a hulling machine which also cleans, classifies, and polishes rice, a group of eight storage silos with a total capacity of 8,000 tons, and separate equipment for processing rice by-products for animal feed.

Plastic Bags for Bananas

Commenting on a report that tests with plastic covers on a Queensland experimental station had not been conclusive, Mr. H. Eastwood, deputy chief of the Division of Horticulture of the New South Wales Department of Agriculture, said that the covering of bunches of bananas with coloured plastic bags to assist ripening is now routine practice in growing areas in northern New South Wales.

The Queensland Director of Horticulture, Dr. A. S. Trout, had said that coloured plastic bags had been tested as a substitute for hessian bags, which had been in use in Queensland for years, but it had been found that bunches covered with plastic were subject to sunburn when their leaf cover was insufficient.

The New South Wales expert said that his Department had no hesitation in recommending the use of coloured plastic bags for bunch covers. Growers on the New South Wales north coast were so accustomed to their use that they were unlikely

ever to discard them. Blue, yellow, and green plastic gave the best results.

The advantages of the use of the bags were that the bananas ripened more quickly; the fruit increased in size and weight by anything up to 25 per cent.; all the fruits on the bunch developed uniformly, including those at the bottom of the stalk.

The plastic covers cost 4s. each and last for four years. Bunches grown under them range up to 143 lb. in weight, the average being over 40 lb. a bunch.

Sturge's Citric Acid Venture in Canada

To meet the increasing world demand for citric acid—used by industries ranging from soft drinks to atomic energy — a British and a Canadian chemical firm have announced the joint formation of a new company in Canada, known as Sturge (Canada) Ltd. Manufacturing plant for the new company is now under construction at Valleyfield, Quebec, and is expected to be in production early next year.

The British firm, John and E. Sturge Ltd., have experience of citric acid manufacture dating back nearly 130 years. In 1930, they were the first British firm to operate successfully a fermentation process for the production of citric acid from sugar. The Canadian partner in the new company is Merck and Co., Ltd., the chemical, pharmaceutical, and antibiotic manufacturers.

Citric acid is used widely in a variety of industries, including, of course, the manufacture of soft drinks, preserves, pharmaceutical products, confectionery, and flavourings. Tests are also being carried out by various authorities using a weak solution of citric acid as a decontaminating agent in the treatment of people and substances which have been exposed to radioactivity.

The output from the new plant will be distributed mainly through the present Canadian agents of John and E. Sturge Ltd. — Dillons Chemical Co., Ltd. — and through Merck and Co., Ltd. Both these companies have for many years been large importers of citric acid.

Food in India's Five Year Plan

Production of food grains, cotton, and oilseeds has either achieved or nearly achieved the targets set in the Indian Five Year Plan, while that of jute and sugar cane has lagged behind the schedule.

The production of **food grains** in 1953-54 (third year of the plan) showed an increase of 11·4 million tons over that in 1949-50 with the result that the target of an additional 7·6 million tons has been exceeded by 3·8 million tons. The large increases have greatly reduced dependence on imports, which in turn have resulted in savings of foreign exchange. The quantities to be imported during the current year—about two million tons — will be utilised for building up reserve stocks.

The target of additional production of **oilseeds** for the plan period was put at 400,000 tons. During the base year (1950-51) 5·07 million tons of oilseeds were produced. In the first two years of the plan, production remained below this level, but in 1953-54 it rose to 5·6 million tons, resulting in a substantial increase not only over the two previous years and the base year, but also over the target figure.

Sugar acreage and production increased considerably in the first year of the plan, mainly as a result of the high prices offered for sugar cane, but reductions in prices later led to a decrease in both acreage and production, which in 1953-54 were lower than in the base year. The acreage and production in 1953-54 were 3·6 million and 4·6 million tons, respectively, against 4·2 million and 5·6 million tons, respectively, in 1950-51.

Achievement Award for Meat Packers

A special Achievement Award to promote research and contribute toward product improvement and development through the meat packing industry has been established by Dodge and Olcott, Inc., of New York.

To be presented annually, the award consists of $1,000 and a gold medal.

News from the Ministries

Regional Food Offices Closed

The existing Regional Food Offices and the Chief Food Offices for Scotland and Wales closed on October 31. The work of defence planning in the regions is being carried on by thirteen small Food Defence Plans Offices. These offices will also be responsible for any residual work of the Regional Food Offices in the next few months.

Lemon Juice from the U.S.

Arrangements have been made for the import from the U.S. of a limited quantity of lemon juice (containing not more than 65 per cent. by weight of commercial sweetening matter), to be purchased with dollars made available under Section 550 of the Mutual Security Act.

Decontrol of Canned Fruit

The abolition from January 1 next of all controls over prices and distribution of canned apricots, peaches, and pears has been announced by the Minister of Food. Arrangements for import by private traders will be announced shortly by the Board of Trade.

The Minister also announced that an allocation of canned apricots, peaches, and pears will be made on December 3 and that supplies will be in the shops in good time for Christmas.

The current controlled prices will remain in force until December 31.

With the decontrol of these fruits will end all controls on canned fruits.

Imports of Dried Peas

Changes in the licensing arrangements for the import of dried peas have been announced by the Board of Trade in Notice to Importers No. 680 of October 20, 1954.

The effect of these changes is to extend the former Open General Licence to permit the import of dried peas from any non-dollar source, with effect from October 25, 1954; and to permit the import of dried peas from dollar sources under Open Individual Licences, valid until June 30, 1955.

Trade Ban Lifted on Many Goods

A number of changes in export licensing control have been announced by the Board of Trade following the recent revision of the lists of goods subject to strategic control if intended for Soviet bloc countries.

The general effect of the revised controls is to reduce the embargo list by about 80 items and the quantitative control list by about 70 items and to enlarge the area of permitted trade in a large number of categories remaining under control. These include general purpose machine tools, locomotives and railway equipment, chemicals, and chemical plant. The changes do not apply to China.

Goods for which licences are not now required (except for exports to China, Hong Kong, Macao, and Tibet) include coffee, certain animal feedingstuffs, certain grain products and edible preparations, bacon and ham, certain oils and oleaginous seeds, freeze drying plant, certain heat exchangers, certain scientific equipment, and certain photoelectric cells.

Minister's Private Secretary

The Minister of Agriculture and Food, Mr. Heathcoat Amory, M.P., has appointed Mr. W. J. B. Hopkinson, O.B.E., and Mr. P. Parkhouse to be his Principal Private Secretary and Assistant Private Secretary respectively in the Ministry of Food with effect from October 18, 1954.

Machinery and Equipment

Defrosting Refrigerators and Cold Stores

Designed to overcome the problems of defrosting a refrigerator or cold room, the Holroyd defroster, supplied by John Downton (Electric) Ltd., ensures the rapid completion of defrosting, dry coils ready for re-freezing and negligible rise in room temperature. Also it eliminates the need to empty the refrigerator for defrosting.

Being gas heated, regulation may be made easily to suit the refrigeration unit to which it is installed; further, gas heating allows intimate contact with the tubes of the heat exchanger, thereby avoiding the heavy heat losses which always accompany electrical heating, owing to the necessary insulation.

With the "Patented" method of distributing heat inside the heater tubes, no spot ever reaches an excessive temperature and the carbonisation of the oil is not possible. Heat is distributed instantaneously to the refrigeration gas without the need for local high temperatures.

Each unit is fitted with an automatic gas lighter and defrosting is started by turning the gas tap on and opening the by-pass valve. When defrosting is complete, it only remains to reverse these operations.

Feed Weighing Equipment

The latest model single headed vibrator feed weighing machine developed by Autopack is constructed as a self-contained unit with forward head; it is designed for the handling of the less free flowing powders, and more bulky materials such as cake flour, cake mixes, shredded suet, and corn flakes.

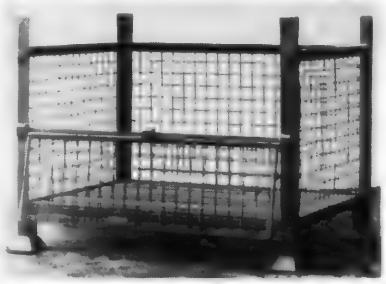
With these materials it is necessary to get a much steeper angle on the discharge chute, and this new machine provides for these conditions.

With the more sticky or fatty mixtures, such as cake mix and shredded suet, the amount of material fed into the machine hopper has to be controlled; these conditions can be readily obtained in combination with the new unit.

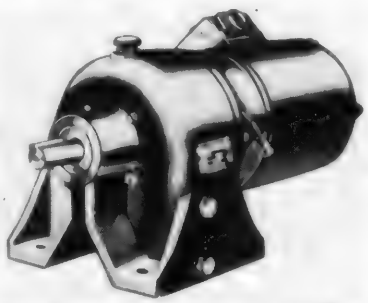
Mixer for the Laboratory

Designed to mix quantities from five to 50 gallons, the high speed mixing machine manufactured by Premier Colloid Mills Ltd. can be used for any of the following operations: liquid/liquid and liquid/solid dispersions; acceleration of chemical reactions; speed-up of solution manufacture; washing; and emulsion premixing and manufacture.

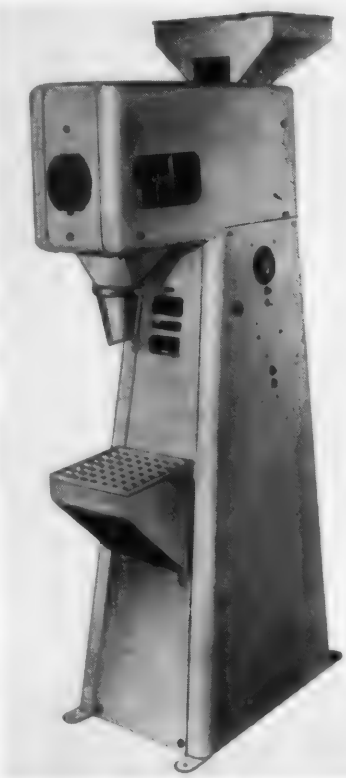
The mixer can be supplied with the *Dispersator* mixing head or fitted with marine propeller.



One of the tpyes of post pallets made by H. and C. Davis and Co. for facilitating mechanical handling. It has an angle iron frame with wire mesh panels and it can be supplied with a half drop panel, as illustrated, or with fully rigid panels. These crates are stackable.



ESR50 fractional geared motor and speed reducer.



This Autopack vibrator feed weighing machine will give from 18 to 20 weighings per minute. Larger models as well as twin, triple, and quadruple units can be supplied.

New Geared Motors and Speed Reducers

Two new types of foot mounting and flange mounting fractional geared motors and speed reducers have been added to the standard range of larger industrial units made by Electropower Gears Ltd. Known as types ESR50 and ESRV50, these new units have a maximum torque at 12 r.p.m. of 24·6 ft. lb. In certain cases slower speeds are obtainable and the units are also available as a two-speed geared motor. The maximum standard ratio is 116·8 : 1; the minimum is 2·56 : 1. Gear wheels, pinions and shaft are manufactured from high tensile steel. The output shaft is fitted with ball bearings, while the first gear, second pinions and intermediate gear, and final pinion revolve on fixed steel layshafts, the pinion being fitted with phosphor bronze bushes. Splash lubrication is provided.

These units can be mounted in practically any position, although the exact position should be stated on the order.

The gearbox is self-contained, the motor being bolted on by four bolts after assembly. Motors of the three-phase, single-phase D.C. variable speed commutator, protected or totally enclosed, types complying with the usual British Standard Specification can be fitted. Units can be supplied suitable for Canadian and American Specifications. A high-speed shaft can be brought out at the back end of the motor, if required. Oil seals are fitted to the final shaft and motor flange shaft. The units can be supplied as self-contained speed reducers with input flange and shaft suitable for driving by flexible coupling or belt drive. Silent in operation, the ESR50 and ESRV50 are suitable for fitting to all types of machinery including food equipment, chemical plant, and herring oil machinery.

Versatile Electronic Recorder

A new electronic recorder of high sensitivity manufactured by the Cambridge Instrument Co., Ltd., is suitable for a wide variety of applications. It is of the continuously balancing type, the rebalancing of the measuring circuit being effected by means of a small servomotor. Any voltage error due to unbalance is converted into a 50 c/s signal of appropriate phase and after electronic amplification is applied to the servomotor to drive it in such a direction as will restore balance.

The recorder is electrically operated from A.C. mains and can be supplied for any voltage up to 250 and for any specific frequency between 40 and 60 c/s.

The chart, 180 mm. wide, passes over a writing platen enabling notes

to be written on the recorder without removing the chart, the past 240 mm. length of which can be seen through the window in the recorder door.

For most applications, the instrument is supplied as a recording potentiometer for the measurement of small D.C. potentials, but the measuring circuit can be arranged as a low resistance current measurer, as a D.C. bridge, or, with certain limitations, as an A.C. bridge or potentiometer.

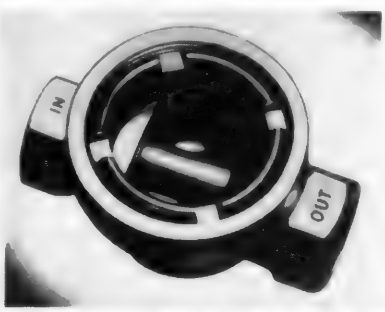
Glass Pipes for Food Factories

As part of a re-equipment project which has already cost over half a million pounds, Smedley's have introduced glass pipes in their factories for all liquids used in canning operations. Quality control is thus ensured at every stage of processing.

Another method of speeding production is the use of specially insulated storage rooms for ripening, or alternatively, cool-storing delicate fruits (*e.g.* strawberries) for the hour or so between arrival at the factory and canning.

A New Sight Glass

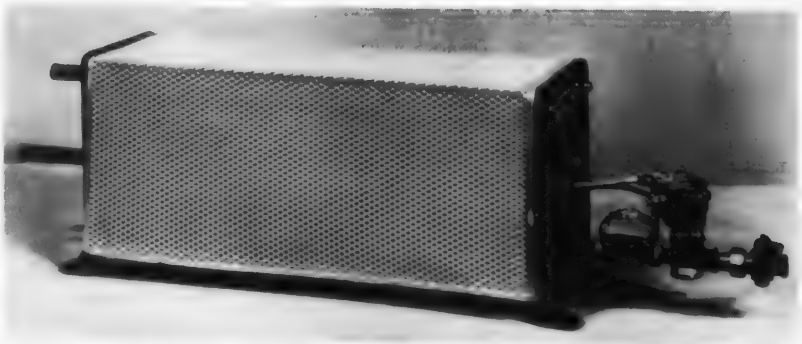
In designing a sight glass, primarily for the purpose of visually checking the discharge behaviour of a steam trap, the designer is confronted with several problems in deciding the path of flow across the viewing space. The



New Spirax sight glass with half-inch connections.

variety of flow channels and contours in different patterns of sight glass is the result of attempts by different designers to arrange a flow path which would meet the known problems without causing fresh ones.

In the latest design of sight glass now being manufactured by Spirax-Sarco Ltd. the method of directing flow across the viewing space is unusual in that a totally enclosed channel extends the greater part of the distance across the glassed-in space. The advantage of this design is that while offering a visual check on flow, it aims to eliminate the problem of glass erosion which is often present when a jet of water impinges on the underside of the window of a sight glass. The "ejector" effect of the arrangement makes this new pattern of sight glass virtually self-cleaning.



Gas-fired defrosting unit for refrigerators and cold stores.

New Irish Company make Dairy Plant

A new company, A.P.V. (Ireland) Ltd., has been formed by agreement between Booth Brothers Ltd. and Thos. Pearson and Co. Ltd.—both of Dublin and already closely linked by family management—and one of the leading dairy and food engineering companies in Europe, The A.P.V. Co. Ltd. of London.

In addition, a company which has long served the needs of Irish creameries, The Creamery Supply Co., for many years controlled by Booth Brothers, will now be taken over completely by the new company and will handle the entire range of A.P.V. products for the dairy and food industries, including heat exchangers, pumps, filters, homogenisers, sanitary fittings, etc.

The company has been formed because for some time it has been apparent that there is a growing need in Ireland for facilities for fabricating stainless steel equipment, which is gaining such an important place in milk and food industries, and which is being used also in canteens, hospitals, and in many other directions. The new company will commence to manufacture all stainless steel equipment in a factory which is being reconstructed for the purpose at Drimnagh, Dublin.

The chairman of the new company is Mr. R. C. Booth, who is also chairman of Thos. Pearson; and the other directors are: Mr. Basil E. Booth of Booth Brothers, Mr. E. Michael Booth of Thos. Pearson, and Mr. W. H. Jones and Mr. R. M. D. Odgers of The A.P.V. Co.

Refrigerator Standards

Following a request for the extension of the range of capacity covered by existing British Standards for household electrical refrigerators, the British Standards Institution have prepared two further standards which make provision for larger commercial and industrial refrigerators, *viz.* cabinets of 12 to 100 cu. ft. net capacity, and sectional cold rooms of 100 to 1,500 cu. ft. gross capacity.

As in the case of the existing standards, no attempt has been made to recommend standard sizes; conditions of manufacture and testing have, however, been prescribed which should ensure a competitive high level of quality for commercial refrigerators made to these standards.

BOOKLETS RECEIVED

Ways in which the Exchequer will help to pay for the modernisation of trade equipment and industrial plant are outlined in a six-page folder entitled "Income Tax Relief and How You Can Benefit," published by the British Electrical Development Association. The leaflet draws particular attention to the investment allowances introduced by the Finance Act, 1954.

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A further monograph in the series on malt and malt products has been published by Muntona, Ltd., and Edward Fison, Ltd., under the title "The Identification of Threshed Barley." It deals with the physical form of the ear and grains of barley, defining the terms used to describe them, with the features used to differentiate between varieties, and with the characteristics of those most common in the British Isles.

*

Mechanical handling is now the recognised solution to the problem of the movement and storage of goods manufactured by mass or batch production methods. H. and C. Davis and Co., Ltd., of Clapham, London, have produced a catalogue which will greatly assist production and planning engineers and others dealing with the problem of selecting pallets and stillages for use with fork lift trucks, hand pallet trucks, and cranes. These pallets and stillages are manufactured in pressed steel and angle of welded construction capable of withstanding rough usage. Pallet stacking is an ideal way of saving space, when used in conjunction with a fork lift truck; goods can be stacked from floor to ceiling, thereby using all available space.

H. and C. Davis will manufacture to the customer's design or submit proposals for special requirements.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Cake Icing

B.7242. *Please supply a recipe for good cake icing.* (Australia)

The following formula can be used as a basis for trial:

Icing sugar	7 lb.
Albumen	1 pint
Glycerin	½ oz.

The albumen and 5 lb. of icing sugar are placed in a mixing bowl and beaten until light, and then the glycerin and remainder of the sugar are beaten in so that a light sugar is obtained that will retain its shape when piped out on to a cake.

Parkin Mixture

B.7243. *Can you supply details of a ready-to-use parkin mixture?* (Yorks.)

The composition of a parkin mixture which could be used as a basis for trial is as follows:

	Parts
Oatmeal	24
Flour	24
Compound fat	12
Sugar	18
Golden syrup	16
Ground ginger	1
Baking powder	1
Salt	½
Milk powder	3½

These ingredients are thoroughly mixed together to a crumbly mass and should be packed in waxed containers or *Cellophane* bags.

Mango Chutney

B.7228. *Please supply details concerning the manufacture of mango chutney.* (London)

Fifty lb. mango chutney is taken as received in casks and mixed with an equal quantity of the following chutney:

Water	2¼ gal.
5 per cent. gum tragacanth in malt vinegar	1½ ,,
Beet, carrots, or turnips, or mixture of these	25 lb.
Onions (not necessary, but important for flavour)	10 ,,
80 per cent. acetic acid	2 ,,
Caramel	5 oz.
Salt (unless brined vegetable is used)	2½ lb.
Ground ginger	4 oz.
Ground cayenne	2 ,,
Ground paprika	3 ,,
Ground cinnamon	3 ,,
Ground pimentos	2½ ,,
Cloves	1 ,,

The chopped or minced vegetable is boiled with the water until soft and is given a further simmering for 10 to 15 minutes with the rest of the ingredients, except the acetic acid, which is added at the end of the simmering. After a thorough mixing, the mixture (enough for two 50 lb. batches of mango) is ready for combining with the chutney.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.7188. *Tarama from cod roes.* (Canada)
B.7189. *Meat meal analysis.* (Midlothian)
B.7190. *Residual oxygen content of nitrogen packed products and strapping machinery.* (Yorks.)
B.7191. *Short paste, rye bread, brown bread, and skim milk powder.* (S. Africa)
B.7192. *Pectin strength tests.* (Angus)
B.7193. *Vacuum evaporation.* (Ireland)
B.7194. *Artificial honey.* (Pakistan)
B.7195. *Substitutes for cocoa butter; margarine manufacture and barley pearling.* (India)
B.7196. *Carton gluers.* (New Zealand)
B.7197. *Can openers.* (London)
B.7198. *Tablet making and confectionery and biscuit manufacture.* (India)
B.7199. *Naringin and hesperidin.* (London)
B.7200. *Bakery compound fat and pastry margarine.* (Surrey)
B.7201. *Lard refining.* (Lancs.)
B.7203. *Coloured flavouring materials.* (Ches.)
B.7204. *Rotary grain driers.* (Nigeria)
B.7205. *Printed and decorated tin boxes.* (Inverness)
B.7206. *Fish and meat pastes.* (London)
B.7207. *Synthetic cream.* (Yorks.)
B.7208. *Pectin plant.* (Angus)
B.7210. *Papain.* (London)
B.7211. *Peanut blanchers.* (Yorks.)
B.7212. *Salad cream.* (Kenya)
B.7214. *Potato crisps.* (Staffs.)
B.7216. *Candied fruits and peanut butter.* (India)
B.7217. *Vanitrope (propenyl guaethol).* (Lancs.)
B.7220. *Fillers.* (Lincs.)
B.7221. *Flooring.* (Lincs.)
B.7222. *Pikelets.* (Leics.)
B.7223. *Tablet manufacture and sterilised milk.* (N. Ireland)
B.7229. *Lard and fat refining.* (Lancs.)
B.7230. *Waffles and sugar lollipops.* (Gibraltar)
B.7231. *Beetroot in vinegar in glass jars.* (Hereford)
B.7232. *Strawberry culots.* (Staffs.)
B.7233. *Licorice.* (Spain)
B.7234. *Whalemeat.* (Spain)
B.7235. *Mushroom cultivation.* (Belgium)
B.7236. *Monosodium glutamate and ascorbic acid.* (Lancs.)
B.7237. *Flavourings for potato crisps.* (Ireland)
B.7238. *Hard boiled confectionery.* (Australia)
B.7239. *Insulated containers.* (Aberdeen)
B.7240. *Canned rice.* (London)
B.7242. *Cake icing.* (Australia)
B.7243. *Chocolate enrobing and sugared almonds.* (Yorks.)
B.7244. *Bottling tomato juice and mushrooms.* (S. Rhodesia)

Recent Patents

716,934. UNIPEKTIN AKT.-GES.: Process for preparing refined sugar syrups from fruit.
716,960. ROSE, DOWNS AND THOMPSON, LTD., and ANDREWS, T.: Apparatus for mixing liquids for treatment thereof and then separating them.
716,985. MOUTON, R. F.: Freeze-drying and reconstituting fermented beverages.
717,095. WALLERSTEIN CO., INC.: Retarding the staling of bakery products.
717,220. MIAG MUEHLENBAU UND INDUSTRIE GES.: Separation of flour and bran
717,294. VERDURIN CO.: Process of treating coffee.
717,302. DRAISWERKE GES.: Kneading and/or mixing machines.
717,335. CARIBBEE PRODUCTS, LTD.: Canning of non-acid fruit.
717,375. WRIGHTS' BISCUITS, LTD.: Handling of biscuits.
717,502. MCLAREN, J. R.: Blanking-off device for baking trays.
717,608. NORMAN AND ELDRED, LTD., and ELDRED, H. R.: Apparatus for cutting meat in tins.
717,618. BERKEFELD FILTERS AND WATER SOFTENERS, LTD.: Cooling food cabinets or safes.
717,621. COPE, WHELON AND CO., LTD.: Egg cleaning apparatus.
717,723. VICARS, LTD., T. AND T., NAYLOR, J. F., and TUNSTALL, W. H.: Transfer of laminar articles such as biscuits.
717,844. BEST FOODS, INC.: Treatment of fats or fatty foods.
717,888. SCHERER CORPORATION, R. P.: Method of embossing gelatine capsules.
717,935. ROSE BROS. (GAINSBOROUGH), LTD.: Sweet-forming and wrapping machines.
717,953. JULIAN, J. A.: Apparatus for treating food products.

ABSTRACTS OF BRITISH PATENTS

Edible Powders

The production of edible powders, suitable for use in soups and for other food purposes, is described.

The method consists of adding a proportion of vegetable or other food product (preferably finely minced or mashed) in the wet state to a dried cellularly intact powder of a starchy vegetable (such as cooked potato powder) or *vice versa* and subsequently drying the mixture. This is to be effected under conditions such that the mixture never contains much over 50 per cent. of moisture and the drying is effected at a temperature up to not much in excess of 50°C.

If cooked potato is used and reduced to dry powder by one of the known methods in such a way that its cellular structures remain substantially intact, it is possible to make, for example, a cooked tomato soup powder by adding cooked tomatoes to the potato powder and then drying the mixture to a powder. By the addition of the cooked tomato in gradual stages a cooked soup powder of whatever proportions as between potato and tomato may be desired, can easily be obtained even to the extent ultimately of substantially 100 per cent. cooked tomato powder, the admixture of the cooked tomato taking place either at intervals in the course of drying in the same machine, or separately.

714,058. *Robert Alexander Spencer Templeton.*

Canning Non-acid Fruit

The invention provides a method of canning non-acid fruits, especially bananas, which comprises treating the prepared fruit with an acid solution, removing surplus solution, canning the fruit in the usual manner and sterilising at a temperature below 212°F.

The acid solution is preferably one having a *p*H value of from 1·4 to 3·0 and, in practice, the fruit is usually treated by immersion in the solution, the immersion period varying from one minute at a *p*H value of 1·4 to 10 minutes at a *p*H value of 3·0, with an optimum of three to six minutes at a *p*H value of 2·4 to 2·6.

By the term "prepared fruit" as used in this Specification is meant a fruit in substantially the same physical condition as that in which it is to be canned, *i.e.* fruit which has been subjected to the operations of peeling, stoning, slicing, or the like.

The acid solution may be an aqueous solution of any one or more of the acids permitted for use in foodstuffs, such as citric, malic, lactic or hydrochloric acids, especially organic acids, but it is preferred to use natural acid fruit juices, especially those having *p*H values in the above-mentioned range, since they are not only effective sterilising agents, but also impart an improved flavour to the product. Natural fruit juices which are particularly suitable for this purpose are lime, lemon, and grapefruit juices.

717,335. *Caribee Products, Ltd.*

Cheddar Cheese

The invention concerns a process for making cheese of the Cheddar type which includes the steps of setting, cutting, and cooking the curd and draining the whey from the curd. To produce such cheese with the desired moisture content, the drained curd, while in the form of discrete particles, is bathed under agitation in an aqueous sodium chloride solution having a concentration and temperature selected in accordance with the principle that increased concentration and temperature decreases the moisture content of the drained curd which, at the conclusion of the bath, is separated from the brine, placed in forms and cured.

As a result of this bathing under agitation the cheese curd picks up a definite amount of salt from the brine, the amount of salt being dependent upon the concentration of the salt in the brine, with little effect due to acidity or temperature of the brine or the time of immersion of the curd in the brine bath (although a short minimum time is required to reach equilibrium, *e.g.* two to five minutes under normal conditions).

It has been found that, if the selected salt concentration of the brine is between 4 and 15 per cent., the temperature of the brine can be varied between 85° to 135°F. to produce a cheese containing a particular desired moisture content in the commercial range, *i.e.* between 34 and 39 per cent. by weight. Thus, it is possible, by controlling the concentration of the brine and its temperature, to produce a stirred curd cheese which has both the desired moisture content and the desired content of salt.

715,500. *Kraft Foods Company.*

Apparatus for Cutting Meat in Tins

The apparatus comprises means for clamping a container, advantageously a cylindrical open-ended tin filled with sausage meat or the like, on a rotatable table; means for cutting the meat in the tin ito lengths of desired section; means for releasing the tin after the cutting operation and removing it on to a conveyor or the like; means for rotating the table through an angular distance to receive a further tin for clamping thereon; and means operating automatically for controlling the timed sequence of operation.

A reciprocating movement may be imparted to the cutting knives through an eccentric mounted on a driven shaft, stripper means being provided in cooperation with the tin clamping means to facilitate withdrawal of the knives without disturbing the contents of the tin.

717,608. *Norman and Eldred, Ltd., and Hubert Reginald Eldred.*

Retarding Staling of Bakery Products

Although the staling of the crumb is a complicated process not fully understood and as to the mechanism of which there are many conflicting theories, it has been found that by the addition of small amounts of a bacterial heat-stable amylolytic enzyme to the dough before baking, it is possible to prevent, or inhibit, or retard the rate of staling of bread. This heat-stable enzyme may be obtained from bacterial sources and is characterised by strong starch liquefying and dextrinising power, alpha amylase activity, and proteolytic activity. The enzyme may be obtained, for example, from certain species of *Bacillus mesentericus* and *B. subtilis* and includes enzymes which are stable up to temperatures of 80°C. to 90°C. Such enzyme preparations of bacterial amylases of high heat stability and strong starch liquefying and dextrinising power are commercially available. By "heat-stable enzyme preparation" is meant one which is present and active in the crumb at temperatures above the starch gelatinisation point.

717,005. *Wallerstein Co., Inc.*

ABSTRACTS OF FOREIGN PATENTS

Method of Producing Polythene Films

Polythene foils are made by calendering the softened polythene, the temperature of the rolls being at least 10°C. below the softening point of the polythene.

German 863,405. *Badische Anilin und Soda Fabrik and R. Linke.*

Low Melting Paraffin Wax

Paraffin wax with a melting point between 125° and 135°F., high tensile strength, and well suited for use in paper milk cartons, is produced by mixing 20 to 35 per cent. of a non-straight-chain distillate paraffin having a molecular weight distribution between 350 and 525 with a straight-chain distillate paraffin wax in the melting point range of 127° to 140°F.

U.S. 2,670,323. *California Research Corporation, M. V. Hunter, and J. R. Segesser.*

Trade Marks

BUTTERHALL. — 729,350. Butter. **Anglo Baltic Produce Company, Limited,** 52/54, Tooley Street, London, S.E.1; Merchants.

GLORIDEW.—729,355. Edible fats. **Chas. Davidson, Limited,** Central Buildings, 24, Southwark Street, London, S.E.1; Merchants.

SURE - TEX. — 729,360. Edible fats. **A. A. Mont, Limited,** also trading as **Alpha Margarine Company,** Brixham Road, Ayres Road, Old Trafford, Manchester, 16; Manufacturers.

HONIGLO.—729,384. Honey; and preparations of honey and glucose for use as food. **Spring and Company, Limited,** Riverside, Brigg, Lincolnshire; Merchants.

POLCON.—729,405. Machines for slicing cheese. **Isaac Poluck,** 58, Malmesbury Road, Bow, London, E.3; Merchant.

EEZIMAC.—729,433. Macaroon paste. **Malga Products, Limited,** Bridge Road, Southall, Middlesex; Manufacturers.

AKOBUS.—729,490. Edible oils and edible fats. **J. and R. Danson (M/C), Limited,** 432, Produce Exchange Buildings, Manchester, 4; Merchants.

BRADONA.—729,558. Flour. **E. B. Bradshaw and Sons, Limited,** Bell Mills, Skerne Road, Driffield, East Yorkshire; Manufacturers.

BROOKES CHOCOLATE DELIGHT.—729,763. Chocolate biscuits for sale in the Counties of Northumberland, Durham, Cumberland, Westmorland, Lancaster, York, Denbigh, Chester, Derby, Nottingham, Lincoln, Stafford, Salop, Warwick, Worcester, Gloucester, and Somerset and in the City and County of London. **W. J. Brookes and Sons, Limited,** Skerton Road, Old Trafford, Manchester, 16; Bakers and Confectioners.

BLACKWOOD BELTSVILLES.—729,771. Live turkeys. **Thomas Henry Kennedy,** Blackwood, Auldgirth, Dumfriesshire, Scotland; Farmer.

DAMAPACK.—729,842. Tinned and preserved meats. **Damara Meat Packers, Limited** (a Public Limited Liability Company incorporated in the Territory of South West Africa), Continental Buildings, Kaiser Street, Windhoek, South West Africa; Canners and Packers.

WINTELLO.—729,885. Fruit juices; and non-alcoholic drinks. **The Birmingham Chemical Company, Limited,** "Wiltell" Works, St. John Street, Lichfield, County of Stafford; Manufacturing Chemists.

MONEX.—729,930. Edible oils and edible fats. **Thomas Hedley and Company, Limited,** Phoenix Buildings, Collingwood Street, Newcastle-on-Tyne; Manufacturers.

CULPORK.—730,069. Pork and pork products (for food). **S. B. Cullifford, Limited,** 104, Tooley Street, London, S.E.1; Merchants.

DOWNYKREM. — 730,152. Synthetic cream (for food). **British Doughnut Company, Limited,** 137, Clapham Road, London, S.W.9; Manufacturers.

ARDIA.—730,153. Margarine. **A. A. Mont, Limited,** also trading as **Alpha Margarine Company,** Brixham Road, Ayres Road, Old Trafford, Manchester, 16; Manufacturers.

COMTEX.—730,154. Edible oils and edible fats. **A. A. Mont, Limited,** also trading as **Alpha Margarine Company,** Brixham Road, Ayres Road, Old Trafford, Manchester, 16; Manufacturers.

PANDON.—730,155. Margarine. **A. A. Mont, Limited,** also trading as **Alpha Margarine Company,** Brixham Road, Ayres Road, Old Trafford, Manchester, 16; Manufacturers.

CLARILAC.—730,169. Cheese making machinery, and parts of and fittings for such machinery. **Clares (Wells), Limited,** Townhall Buildings, Wells, Somerset; Manufacturers.

DEMERADO.—730,178. Demerara sugar. **Booker's Produce, Limited,** Market Buildings, 29, Mincing Lane, London, E.C.3; Merchants.

TOPA.—730,204. Poultry (other than live poultry). **William Alfred Tutton** and **Anthony Richard Tutton,** trading as **W. A. Tutton and Son,** Buttington Hall, near Welshpool, Montgomeryshire; Poultry Breeders and Merchants.

BROOKES GINGER STIX.—730,268. Ginger biscuits (other than biscuits for animals) for sale in the Counties of Northumberland, Durham, Cumberland, Westmorland, Lancaster, York, Denbigh, Chester, Derby, Nottingham, Lincoln, Stafford, Salop, Warwick, Worcester, Gloucester, and Somerset and in the City and County of London. **W. J. Brookes and Sons, Limited,** Skerton Road, Old Trafford, Manchester, 16; Bakers and Confectioners.

VINIT.—730,277. Wines. **M. Calthorpe and Company, Limited,** 128, Park Lane, London, W.1; Manufacturing Chemists.

MIRASOL.—730,394. Binding material for use in the manufacture of meat products. **Jack de Miranda,** 96, Spuistraat, Amsterdam, Holland; Merchant.

OBRINO.—730,481. Sherry wine. **Coverdale and Company, Limited,** London House, 3, New London Street, London, E.C.3; Wine and Spirit Merchants.

MEMADINE.—730,686. Wines (alcoholic) and spirits (beverages). **Braddocks (Chemists), Limited,** 7a, Manchester Street, Oldham, Lancashire; Retail and Manufacturing Chemists.

DAIRYSEAL. — 730,709. Disinfectants for use in dairies. **Marie Adelaide White** and **Maurice William White,** trading as **Calvert Manufacturing Company,** Balderston Court, Calvert Street, Norwich, Norfolk; Manufacturers.

New Companies

K. Jackson, Limited. (536459.) 57, Walton Street, Aylesbury. To take over business of bakers and confectioners, carried on at 57, Walton Street, and 14, High Street, and at 28 and 30, Chapel Street, Aylesbury, Bucks. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: K. Jackson and Mrs. M. Jackson, 57, Walton Street, Aylesbury.

Maynard and Collard, Limited. (536461.) 188, South Lambeth Road, S.W.8. To carry on business of fish fryers and curers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: G. B. Maynard and Joan L. Maynard, 9, Stratton Avenue, Wallington, Surrey; Annie E. Collard, 21, Hayes Street, Hayes, Kent.

Frodsham Mineral Water Company (1954), Limited. (536514.) 26, Nicholas Street, Chester. To take over business of a mineral water manufacturer, carried on by George Williams and previously carried on by Frodsham Mineral Water Co., Ltd. (in voluntary liquidation) at Mill Bank, Main Street, Frodsham, Ches. Nom. cap.: £1,000 in £1 shares. Dirs.: G. Williams and Mrs. R. Williams, Millbank Farm, Frodsham, Ches.

Haddon Dairy Company, Limited. (536517.) The Dairy, Water Street, Bakewell, Derbyshire. To take over business of a dairyman, carried on at Bakewell by William F. Jex-Blake. Nom. cap.: £1,500 in £1 shares. Dirs.: W. F. Jex-Blake, The Dairy, Water Street, Bakewell, Derbyshire; M. N. Mosley, Haddon House Farm, Bakewell, Derbyshire; J. W. Rains, Bowling Green Farm, Bakewell, Derbyshire.

Igall, Limited. (536624.) 23, Temple Street, Liverpool, 2. To carry on business of importers, exporters, growers, and salesmen of and dealers in British, Colonial and foreign fruit, vegetables, etc. Nom. cap.: £1,200 in £1 shares. Dirs.: E. de Esnarrizaga, 16, Castlebar Park, Ealing, W.5; H. J. Grimwood, 16, Salt Hill Avenue, Slough; N. D. Catterall, 49, St. Thomas Drive, Hatch End, Middlesex.

Interstate Casing Company, Limited. (536634.) To carry on business of dealers in and manufacturers of sausage skins, casings and animal by-products, etc. Nom. cap.: £4,000 in £1 shares (10 "A" and 3,990 "B"). Dirs.: not named. Subs.: G. D. Hyman, 14, Avenue Lodge, Avenue Road, N.W.8 (secy.); N. I. Beckman, 24, Armitage Road, N.W.11 (clk.).

Atlantic and Pacific Tea Company, Limited. (536690.) 12, Whitehall, S.W.1. Nom. cap.: £100 in £1 shares. Dirs.: J. S. Gwatkin, Redhill House, Petworth, Sussex; D. I. Wilson, Lickfold House, Lodsworth, Sussex; J. A. Mallows, 172a, West Hill, Putney, S.W.15.

Haute Emprise Company, Limited. (536770.) Rushacre Works, Narbeth, Pembrokeshire. To carry on business of manufacturers of and dealers in mineral and aerated waters, cordials, syrups, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: G. Williams, Gate House, Lampeter, Velfrey, Narberth; A. Irving, Bentley Villas, Narberth.

Twentieth Century Confectionery Company, Limited. (536819.) Nom. cap.: £100 in £1 shares. Dirs.: to be appointed by subs. Subs.: G. W. Russell (solr's manager) and Margaret L. Corker (typist), 108a, Cannon Street, E.C.4.

Aylesbury Vale Meat Company, Limited. (536820.) Botolph Chambers, 119, Bishopsgate, E.C.2. Nom. cap.: £2,000 in £1 shares. Dirs.: G. T. Rayner, 26, Highbridge Walk, Aylesbury; G. A. Pratt, Rectory Farm, Hardwick, Aylesbury.

Cake Craft, Limited. (536844.) To take over business of "Cake Craft" carried on at 132, Spon Street, Coventry, by Reginald G. Coles and Ronald W. C. Rock, and to carry on business of manufacturers of and dealers in cake decorations, etc. Nom. cap.: £2,500 in £1 shares. Permt. dirs.: R. G. Coles, 132, Spon Street, Coventry; R. W. C. Rock, 49, Sutton Common Road, Sutton, Surrey.

Cocker and Laycock, Limited. (536849.) 1, Abattoirs, Blackpool. To carry on business of distributors of and dealers in meat, etc. Nom. cap.: £16,000 in £1 shares. Dirs.: O. B. Laycock, The Uplands, Hardhorn Road, Poulton-le-Fylde, Blackpool; E. Cocker, Newton Lodge Farm, Staining, nr. Blackpool; F. V. Laycock, Matthew E. Laycock, and John Cocker.

Freeco Bakeries, Limited. (536855.) 29/31, Euston Road, London, N.W.1. Nom. cap.: £2,000 in £1 shares. Dirs.: P. Cope, 6, Rookwood Court, London, N.16; R. Cohen, 32, Wrexham Road, London, E.3.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

FOOD MANUFACTURE

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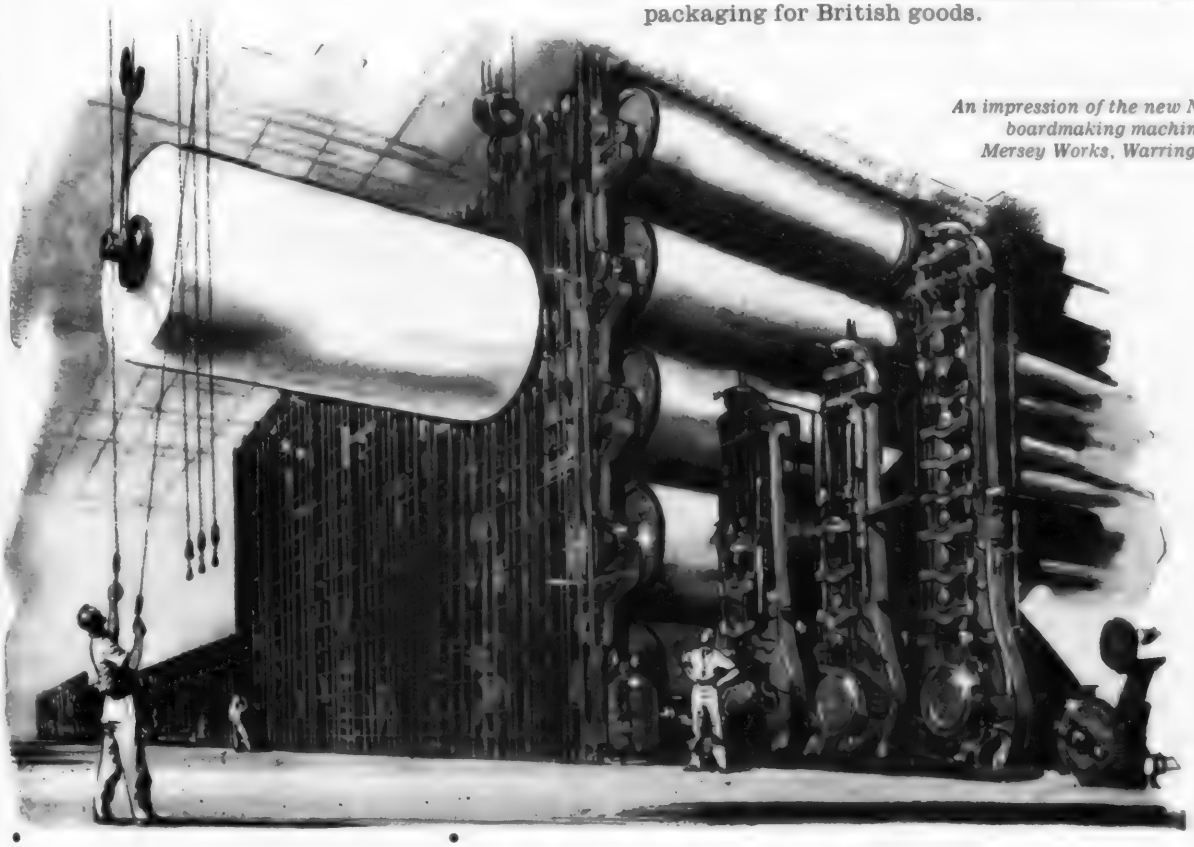

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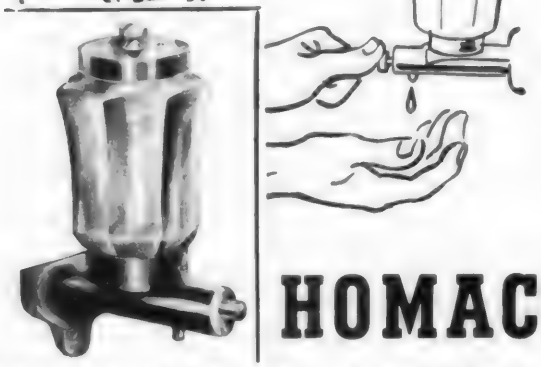

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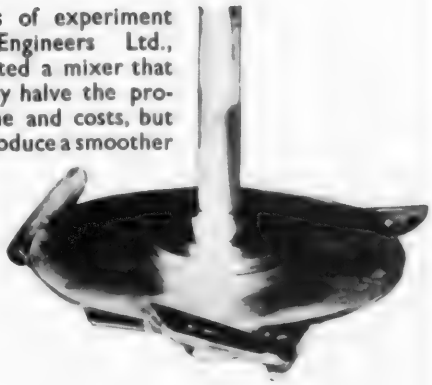

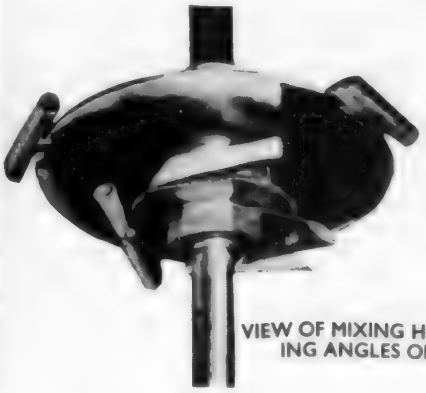

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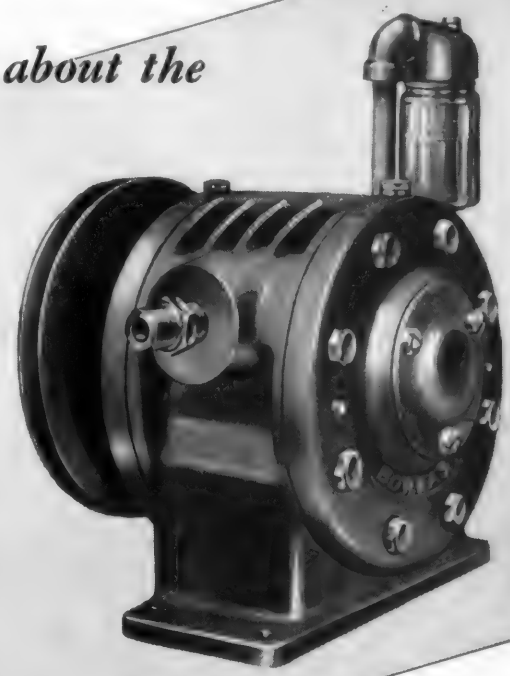

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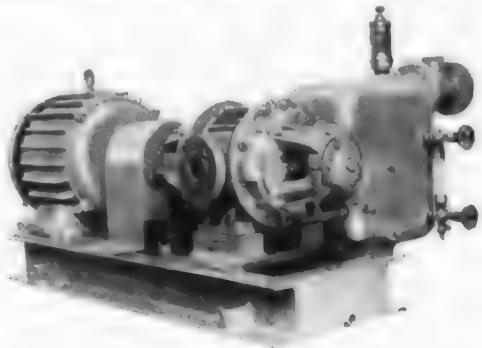

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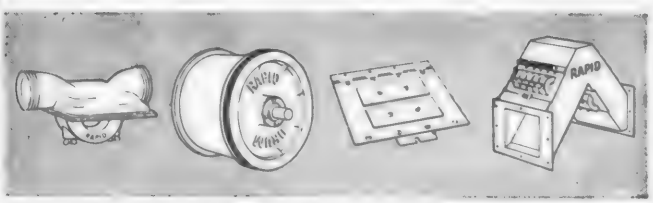

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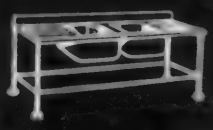

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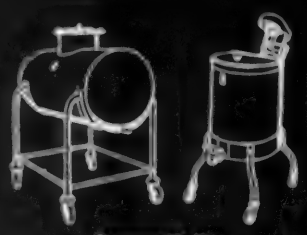

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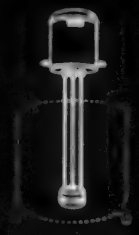

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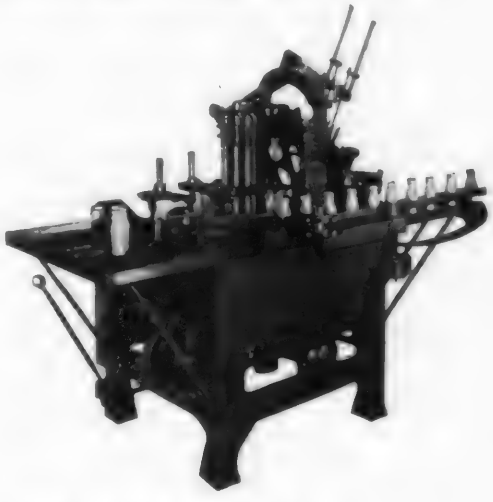

The illustration shows body and all round neck labels being affixed simultaneously to Heinz salad cream bottles. The Purdy "Unimatic" labeller can equally well be fitted to handle round, oval, square and many other shaped containers and to do single or multi-label work, labels, with certain exceptions, being gummed over entire surface to ensure perfect adhesion. The machine, which has a variable speed drive, is fully automatic in operation. Output depends to some extent on the work handled, estimates being given when samples of such are submitted to us.

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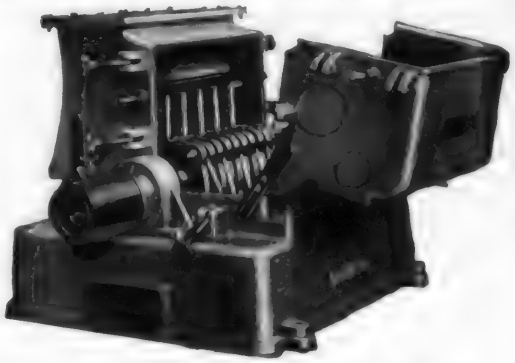

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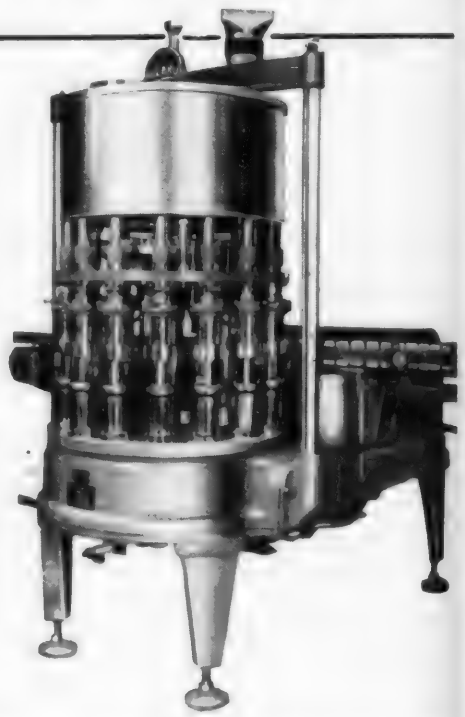
A new 15-head fully-automatic filler for powders



This Albro 15-head fully-automatic, vacuum-operated rotary Powder Filler (the first of its kind) is capable of an output of 120 containers a minute.

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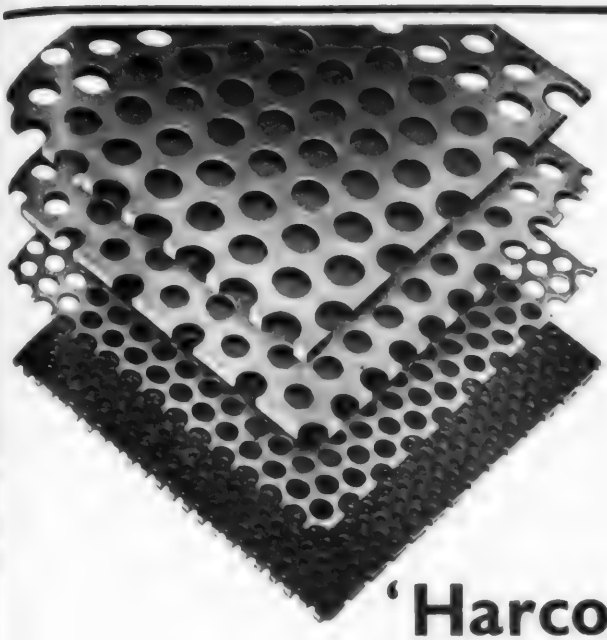

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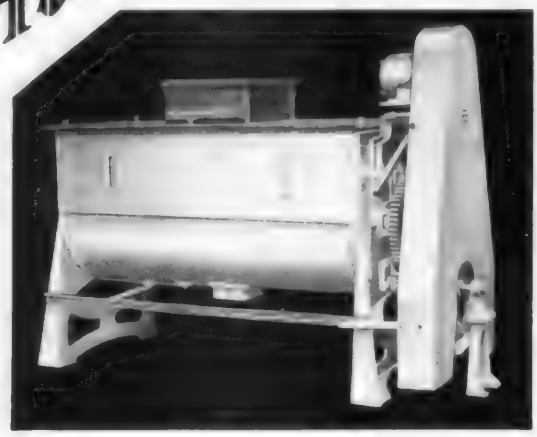

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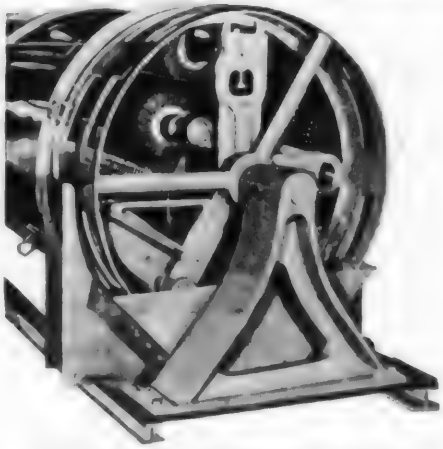

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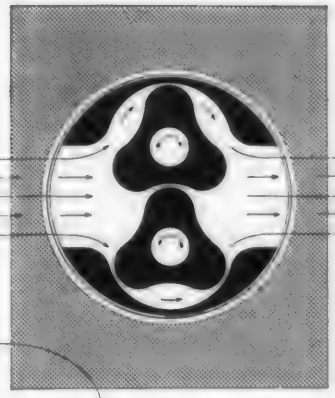

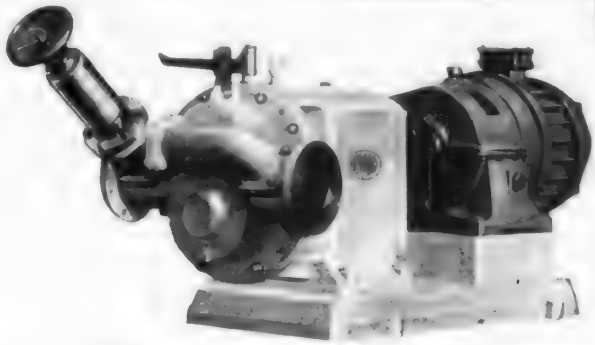

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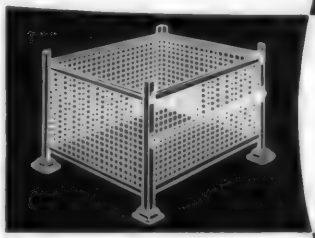

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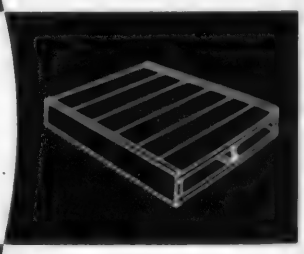

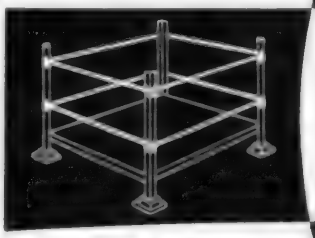

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use an ATOMILL for fast fine grinding

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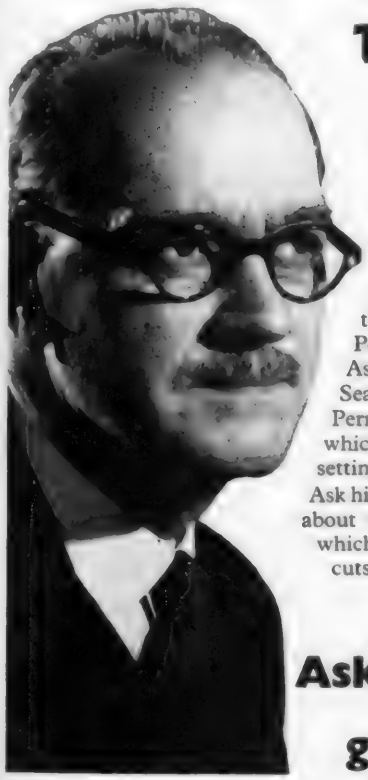

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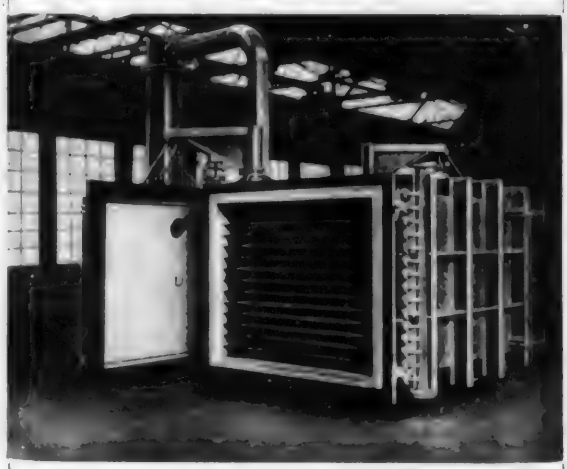

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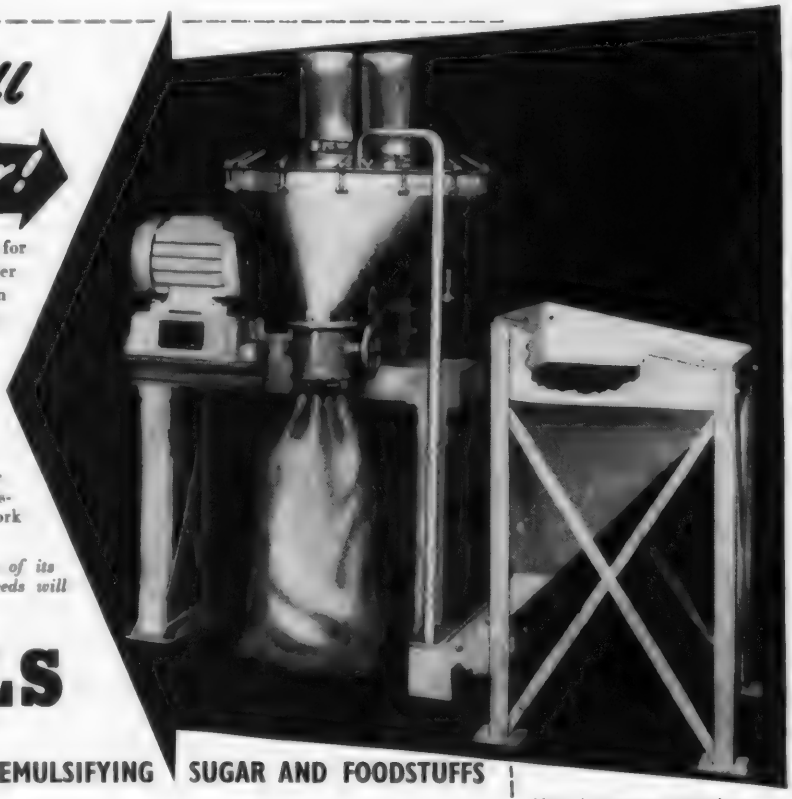

Note the compact assembly with feed hopper standing conveniently at floor level.

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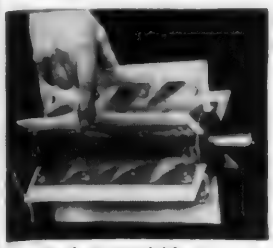

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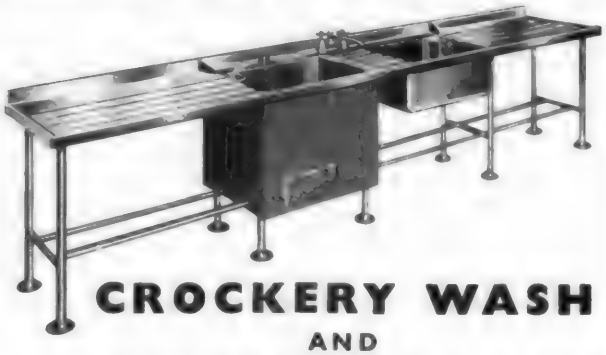

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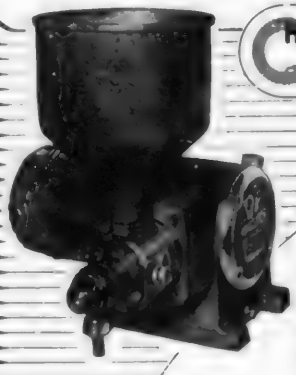

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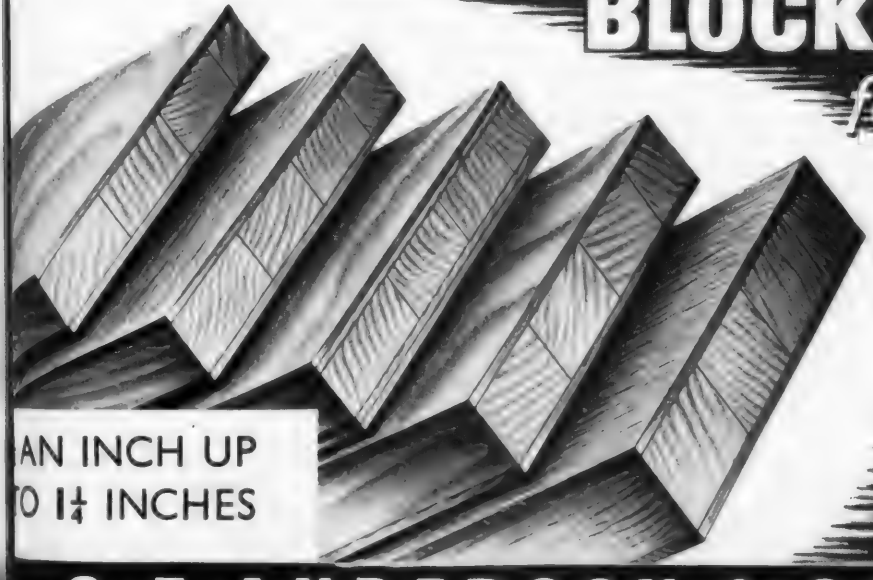

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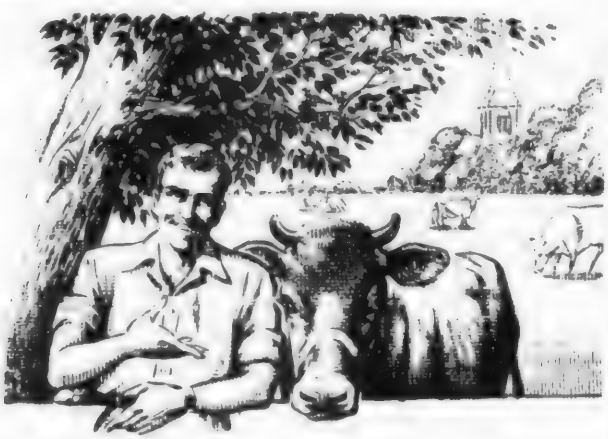

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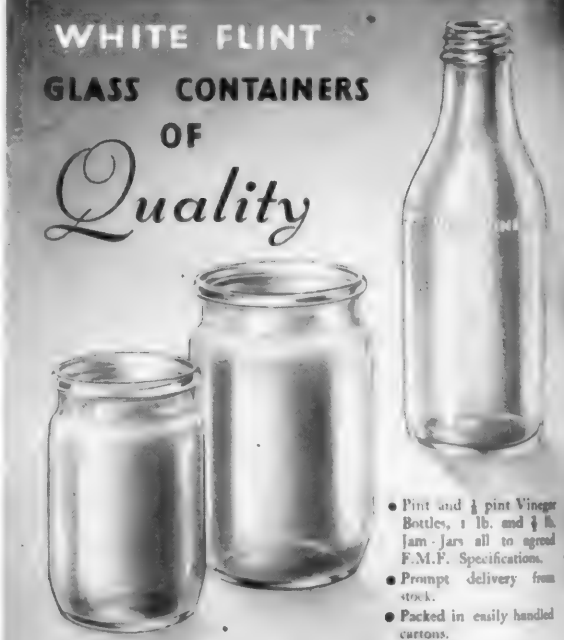

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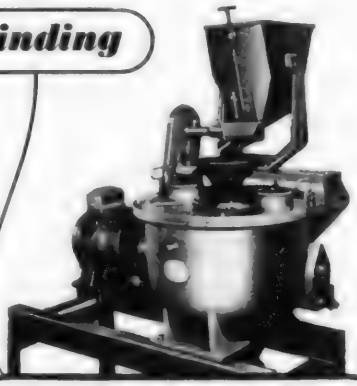

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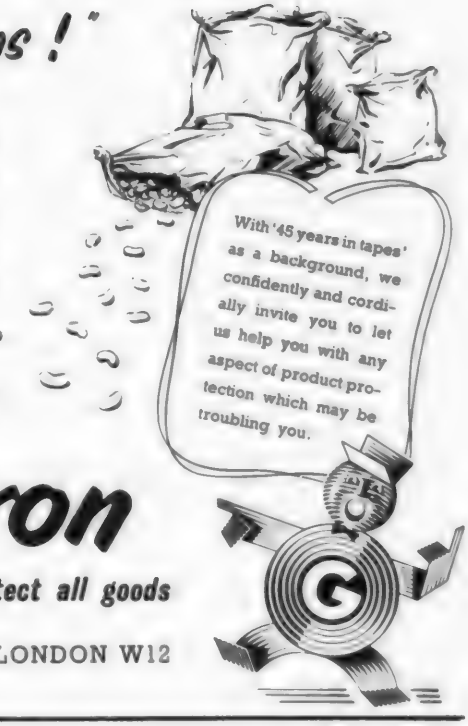
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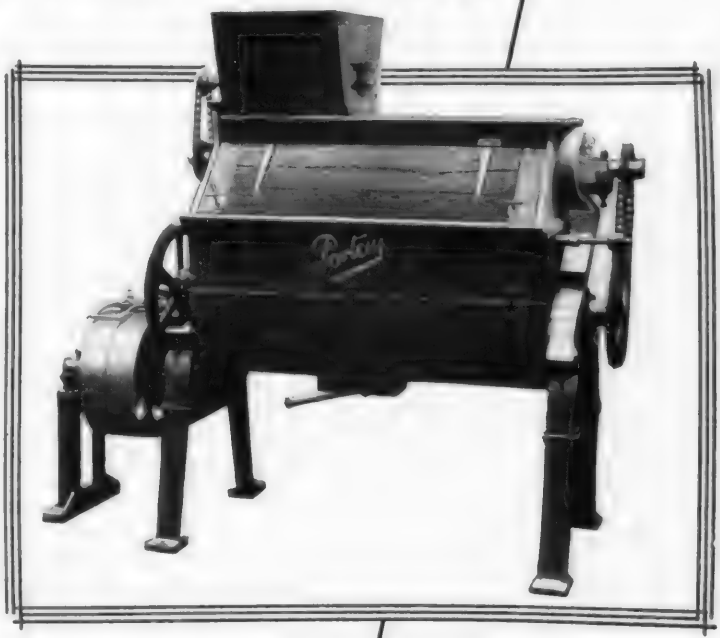

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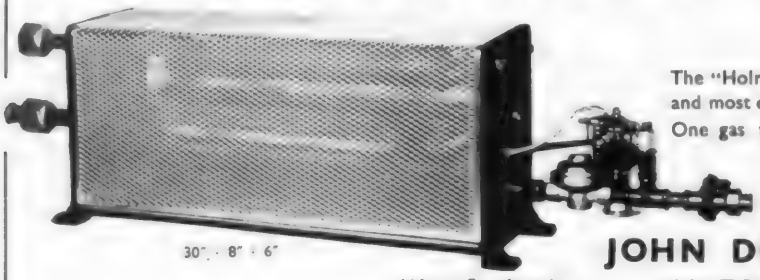

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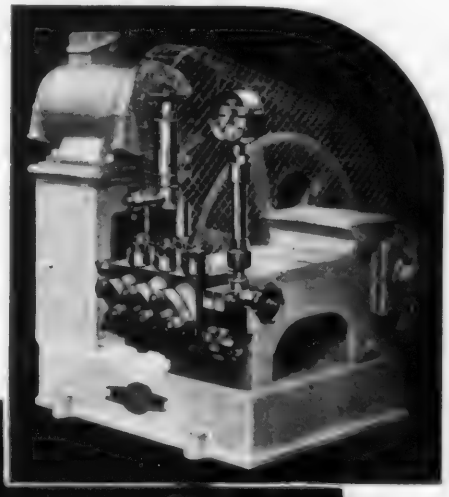

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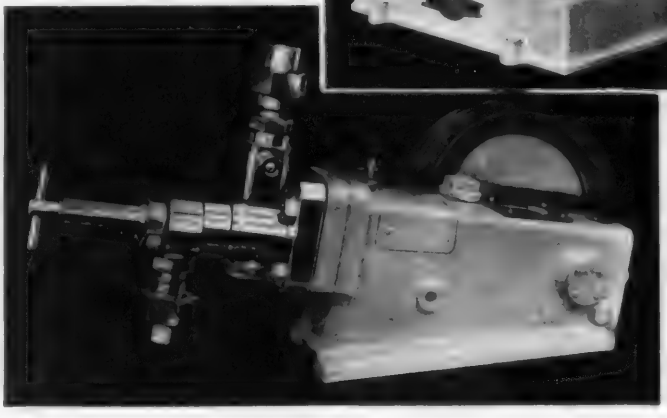

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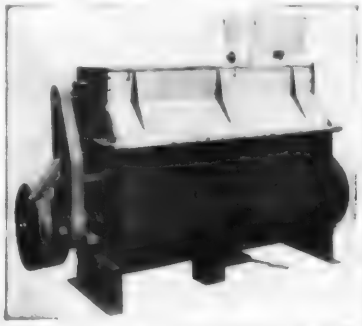

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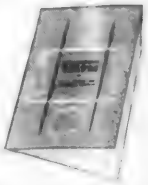

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TIME and Motion Study Engineer required by old-established and progressive Chocolate and Sugar Confectionery manufacturers in the London area. Applicants must be between the ages of 25 and 35 and possess sound education and practical experience.—Please reply, giving full details of age, education and salary required to Box B4845.

CAN Seamer and General Mechanic required for food factory in Manchester area.—Apply, giving details of experience and salary required to Box B4854.

WORKS Chemist required by Seedcrushers and Edible Oil Refiners in Glasgow. Work will be mainly of an applied nature with scope for later transfer to technical management. Applicants must have B.Sc. or A.R.I.C. Good conditions. Salary according to experience. Excellent opportunity for graduate with one to three years' industrial experience, not necessarily in oils and fats.—Reply in confidence to Works Manager, Clyde Oil Extraction Ltd., King George V Dock, Glasgow, S.W.1.

SITUATIONS WANTED

ASSISTANT Factory Manager is desirous of a change. Experienced in pickles and sauces, fruit and vegetable canning, also meats.—Write Box B4836.

IRISH citizen, work public analyst (London), seven years Food Industry, chemist, assistant production manager, expert malt extract, hon. degree medicine; fluent French, Italian, German; would like position Food Industry or pharmaceutical manufacturers, home or abroad.—Box B4838.

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VACUUM Evaporator for Low Temperature Concentration any liquid product, available off season.—Tipperary Products Ltd., Clogheen, Co. Tipperary, Ireland.

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WINE Lovers. Interesting news for amateur wine brewers.—Write: Hidalgo, Market Place, London, W.1.

THE proprietor of British Patent No. 625012, entitled "Improvements in or relating to the manufacture of peanut butter," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14, E. Jackson Boulevard, Chicago, 4, Illinois, U.S.A.

CHANNEL ISLES. Opportunity to acquire flourishing meat processing factory fully equipped for manufacturing all types canned or open packs. Good local trade living accommodation available if required. Approximate sum required £10,000, or present owner may consider leaving part capital.—Box B4833.

THE Director of *Mrs. Gwynne's Experimental Kitchen* desires to introduce her "Chestnut Chutney" to manufacturers interested in developing new lines. Kitchen production of this speciality on a small scale has been sold to Fortnum and Mason, Harrods and to many private clients. Export agents interested. A variety of original food lines are now in active preparation.—Box B4837.

FRUIT Processors Managing Director visiting New Zealand via U.S., view expansion, willing undertake other business or Commissions.—B4839.

RAIL Tank Cars for Hire. Twelve 20-ton capacity, coiled and lagged; fourteen 20-ton capacity, coiled, unlagged. Starred for fast traffic. Recently engaged in carrying edible oils. Excellent condition.—Enquiries to: C.W.S. Ltd., Railway Wagon Works, Woodstone Wharf, Peterborough, Northants.

CONCENTRATED Flash-pasteurised Orange Juices from Agusti are better in all respects, perhaps even extraordinary.—Enquiries Agusti Hidalgo Almazora-Castellon, Spain, or Agusti Hidalgo (London), Ltd., Bank Chambers, Market Place, London, W.1.

SOUP Powders. Small Food Manufacturer, a qualified chemist, would like to contact chemist or technician with practical experience of soup powders.—Write, giving experience and suggestions for helping, to Box B4848.

APPLES for Canning, Jam and Mincemeat. 500 tons hand-picked Bramleys, machine graded 2¼ in.-2¾ in.-3 in. to your requirements. Also Swedes and Carrots for Canning. We shall be pleased to submit keen quotations delivered to your factory in 6-ton loads on receipt of your enquiry.—Horace Sullivan Ltd., Fruit Merchants, 133, Widemarsh Street, Hereford. Tel.: 2532 (4 lines).

PLANT FOR SALE

ROLLER Conveyor with belt 30 in. wide by 25 ft. centres, plus bends and feed rollers, motorised, 400/440/3/50; Gardner, size G, 300-lb. Sifter-Mixers; Southall and Smith Automatic Weighers and Filling Machines, up to 3 lb.; stainless steel 100-gall. water-jacketed Mixers; stainless steel 60-gall. steam-jacketed Pan; stainless steel 60-gall. gas-heated water-jacketed Pan; stainless steel 5 in. Premier Colloid Mill; stainless steel Hurrell Homogenisers; stainless steel 2- and 3-throw Homogenisers; Kek No. 3 Grinding Mill, 15 h.p. motor; Herbert No. 6 Atrittor Pulverising Mill; aluminium Tanks 750, 1,000 and 1,300 gall.; ten steel oval Tanks, each 1,500 gall., totally enclosed, manhole covers.—Dartnall, 248, Humberstone Road, Plaistow, London, E.13.

CRYPTO Cake and Dough Mixer, and Mincer, 60 qt. capacity, almost new; Albro Sweet Pickle Filling Machine, new and unused; Ultra Rapid Shredding, Chipping, Strawing, Dicing and Mincing Machine, new and unused.—T. E. Gallagher and Sons, Earl Street, Belle Green Lane, Higher Ince, Wigan.

GARDNER, size E, 150 lb. Sifter and Mixer; Gardner, type " L," G.G., 3-cwt. size, Mixer only, motorised, practically new; 5-cwt. size Burr Sifter and Mixer, as new.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

FOR Sale: Vegetable Dicing Machine by Brierley and Collier, £50; copper-jacketed Pans (two), £40 each; Pudding Depositor, " Universal," by Peerless, £220; Metal Detector, " Cintell," fitted on wooden table with Perspex top 11 ft. 8 in. by 2 ft. 11 in., £350; hand Sausage Machine, compact, £5; Potato Peeler, " Peerless," VP 14, £10; Potato Peeler, " Peerless," VP 56, £25; " Beth " Can Labelling Machine, £50; Artofex Mixer, 1½-sack, with four bowls, £750; seven double compartment Jelly Cooling Tables, with water jacket. Any reasonable offer considered.—Box B4843.

A.P.V. 10-in. Sieving Machine, very little used, complete with A.C. motor, stainless steel construction, £85; Albro Major, single-head Vacuum Bottle Filling Machine, stainless metal, complete with pump and D.C. motor, £45.—Box B4850.

COMBINED Sifting and Mixing Machines, sizes 5 cwt. and 3 cwt. ex stock.—Makers: D. Burr and Son Ltd., Drayton Place, West Croydon.

GARDNER Mixer, as new, used only a few months, motorised, model L. GG. 3 cwt. size. One 5 cwt. size as new, Burr Sifter and Mixer, as used for self-raising flour, custard powder, etc.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

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HOMOGENISER, stainless steel Tanks and other equipment, excellent condition.—Box B4776.

SOUTHALL and Smith automatic Weighing and Filling Machines up to 3 and 7 lb. Gardner, size G, Sifter Mixers. Young 600 lb. Sifter Mixer. Drum Mixer, 7 ft. by 8 ft. long. Kek Mill, No. 3, with 15 h.p. motor, etc.—Dartnall, 248, Humberstone Road, Plaistow, London, E.13.

Powell & Co., 'Drum Master' Works, Burry Port, Carm

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600

TEN new twin-roll Spray Driers, Escher-Wyss System. Drier rolls of chilled cast iron, 40 in. long by 32 in. diam., for max. 74 lb./sq. in. w.p., fitted air-cooled doctor blades, rotary disc distribution trough, air spray jets and worm discharge conveyors. Stainless steel feed pump, jacketed feed tank, aluminium encased powder dresser, valves and gauges.

Six new Vacuum Drying Ovens of m.s. welded constr., approx. 7 ft. long by 42 in wide by 42 in. deep, fitted nine steam-heated shelves to carry thirty-six acid-resisting metal trays, 36 in. long by 16 in. wide by 1¾ in. deep. Davit swung door at each end, hand wheel closing. With horiz. wet vacuum pump, pressure and vacuum gauges, metal trays and connecting pipe.

Cylindrical Powder Blender, approx. 7 ft. 6 in. diam. by 5 ft. long, fitted internal flights and equipped with twin discharge openings with covers. Blender is arranged for drive by girth gear from electric motor through reduction gearbox and is complete with steel staging.

Vertical open top Mixer by Kellie, 30 in. diam. by 22 in. deep, 50-gall. capacity, 16 g F.D.P. stainless steel lined monel metal coil heating, 1 in. centre outlet; m.s. mixer body on four tubular legs, stainless steel fittings, and horiz. three-arm nickel silver agitator 31 r.p.m., motorised 420/3/50.

Sifter/Mixer by Gardner, 300 lb. capacity, mixing trough 60 in. long by 19 in. wide by 19½ in. deep, with ribbon-type agitator. Brush sifter vee rope driven through gearing by 2½ h.p. motor, 415/3/50. Bottom of mixer hinged and fitted gate discharge.

Two new Wet and Dry Horiz. Vacuum Pumps, type PN. 6, single-stage, double-acting type; capacity approx. 200 cu. ft. per min. displacement at 125 r.p.m.; fitted outboard bearing with driving pulley; approx. 12 h.p. required to drive.

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MARMALADE Manufacturing Plant comprising: Kellie and Whites orange quartering machines; B.C.H. " Turnbull " peel chipping machines; Kellie chipping machine; Kellie shredding machine; B.C.H. 8-in. stainless steel pulping machines; 40-gall. capacity copper-jacketed boiling pans; copper cooling tank; Purdy and Autorex jar labelling machines; Taggart steam steriliser for 1 lb. and 2 lb. jars.—Apply C. Skerman and Sons, 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

AUTOMATIC Bottle Labelling Machine by G. D. Peters Ltd., for bottles up to 10 in. high, single up to 4 in. wide, or pairs to 2 in. wide. Sixty per min. and 120 per min. respectively. Machine motorised and adjustable for various bottles.—Box B4840.

AUTOMATIC Capping Machine by G. D. Peters Ltd., for pre-screw caps and bottles or jars. Speed up to 300 per min. for sizes 2½ in. to 10 in. high by 4 in. diam. or width. Motorised.—Box B4841.

Phone 98 Staines

UNUSED portable elec. Mixing Arms, 400/440/3/50, ½ h.p., geared 1,420/350 r.p.m.; £32 10s. each. Three copper-jac. Tipping Mixing Pans, 27 in. diam. by 19 in. deep, 440/3/50. Glass-lined cyl. enc. Tanks, 7,000 and 2,400 gall. Heavy twin spiked Roll Crushers, 27 in. by 16 in. and 18 in. by 12 in. " Perkins " twin " Z " blade jac. Mixer, 29 in. by 29 in. by 22 in. Ditto, 20 in. by 19 in. by 16 in., with vacuum cover. Bowl Mixers, 20-, 40- and 80-quart. Roller Conveyor, 14 in. by 8 in. pitch. Cooling or Drying Rolls, 3 ft. by 3 ft. and 9 ft. by 4 ft. diam. " Alite " Powder Filler, ¼-oz. to 3-lb. packets. Sifter/Mixers, 24 in. by 14 in. by 15 in., 48 in. by 18 in. by 21 in., 60 in. by 19 in. by 20 in. and 72 in. by 24 in. by 24 in. Chocolate Kettle, 39 in. by 28 in. deep. Jac. Choc. Mixers, 44 in. by 44 in. Thirty " Z " and fin blade Mixers up to 42 in. by 28 in. by 38 in. Sectional steel Tanks, 44,000, 10,000, 4,000 and 3,200 gall. Ovens, condensers, calorifiers, boilers, pans, hydros, refiners, disintegrators, edge runners, extruders, mincers, steam and diesel engines, etc.—Send for lists. Harry H. Gardam and Co. Ltd., Staines.

THREE jacketed Jam Pans, copper bottoms, stainless steel tops, 60 lb. working pressure, £55 each; small Almond Grinder, £30, and Almond Blanching Machine, £30.—J. Harradine and Sons Ltd., 294, St. James Road, Bermondsey, S.E.1.

ONE Mitchel Dryer, eight fans, six trolleys and wire trays, doors both ends, 10 h.p. motor. One Rotary Dryer for continuous drying of coarse or granular material with air heaters, fan, trunking. Capacity 1 cwt. p.h. evaporation. One Retort, rectangular, with swing door 20 lb. w.p. All redundant, but in good working order. Floor space urgently needed. —Dryfood Ltd., 178-82, Bollo Bridge Road, Acton, W.3.

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PEERLESS electric Universal Depositor, late Super Model, 1-4½ lb., £175. Baker Perkins Gridlap Mixer, motorised, late model, £225. Peerless electric Potato Peeler, 28 lb., £45. Hobart, Peerless and Crypto Mixers, sizes 10-80 quarts. All in excellent condition.—Beckett and Co., Walton Street, Heywood, Lancs. Tel.: 6615.

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Have you any dormant or slow selling goods that you wish to clear which are taking up valuable space? We are spot cash buyers for any quantity of the above.

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(Please mention this advertisement when replying.)

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WANTED: Large quantity of 2- or 3-gall. jars with at least 4-in. aperture. Complete with caps.—R. W. Redfern Ltd., Garden Factory, Patrington.

I BUY discontinued lines, old stocks, small or large lots, canned goods, chocolates, sweets, groceries, biscuits, hardware, chemist's sundries, polishes, soap powders, fancy tins, cardboard boxes for packing chocolates, sweets.—Paul, 413, Bury New-road, Salford, 7. Tel.: Broughton 2700.

ADVERTISER purchases Waste Fats and Oils. Give full details and forward samples to L. R. Stevens, "Stella Maris," Dirtham Lane, Effingham, Surrey. Tel.: East Horsley 3229.

REQUIRED redundant Wooden Boxes, Cases, Bottle Crates and Containers in large quantities.—Full particulars price etc., to Silverdale Box Supplies Ltd., Burgess Hill, Sussex. Tel.: 3485.

MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

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RED Powder Colour, Bush's, approx. 5 cwt., clearance price. Electrically heated 9-gall. jacketed s.s. Pan with agitator. Emulsifier and two-stage Cooler, 9 g.p.h. Electric Sterilising Chest. All in excellent condition and cheap.—Beckett and Co., Walton Street, Heywood, Lancs. Tel.: 6615.

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PURDY Rotary or Banks Automatic Bottle Labelling Machines required. Condition not of importance.—Please state full details and price required to Box B4849.

WANTED: One A.P.V. Paraflow Heat Exchanger, type H.T.A., second-hand but in good working condition.—Box B4853.

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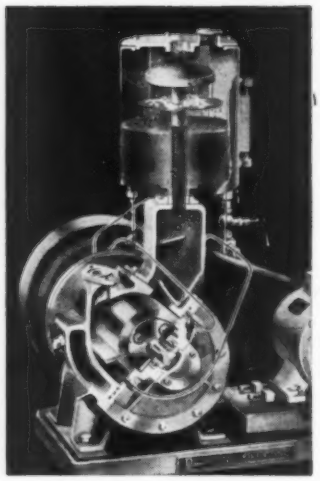

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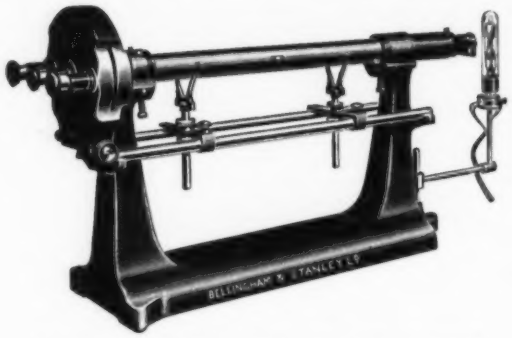

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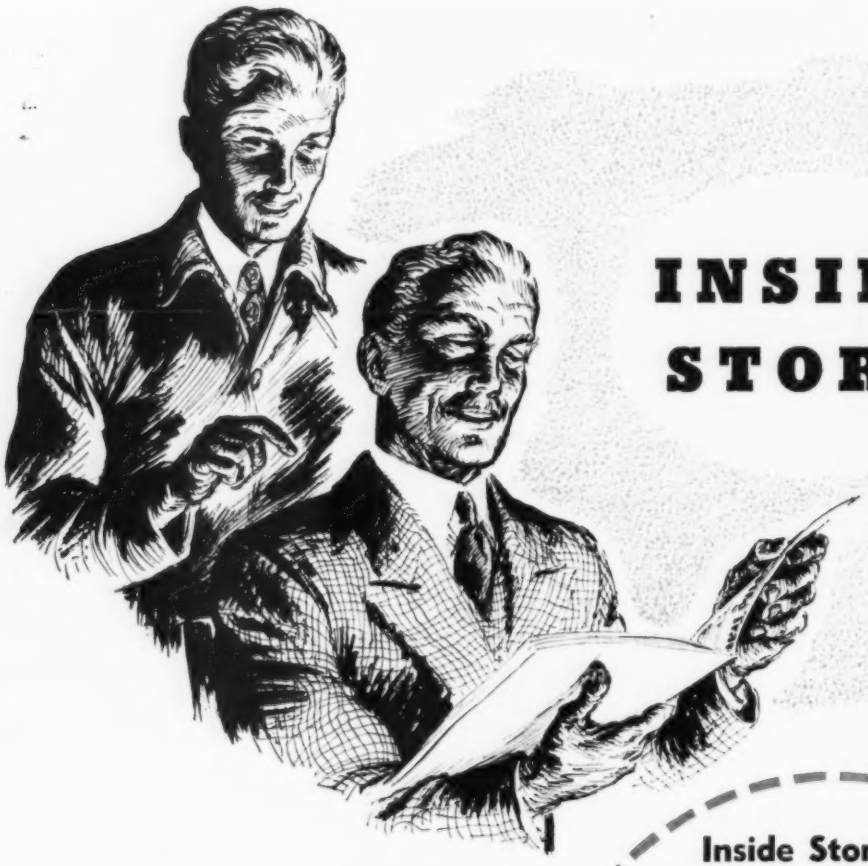

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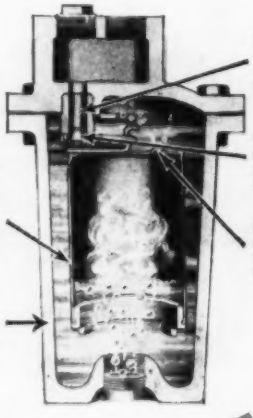
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